DOCUMENT RESUME

ED 115 042 EC 080 488

AUTHOR	Hesse, Kathleen; And Others
TITLE	Down's Syndrome Children's Early Comprehension of WH Questions Asked in Naturalistic and Experimental Settings. Research Report No. 87.
INSTITUTION	Minnesota Univ., Minneapolis. Research, Development, and Demonstration Center in Education of Handicapped Children.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
BUREAU NO	332189
PUB DATE	Apr 75
GRANT	OEG-09-332189-4533(032)
NOTE	100p.
EDRS PRICE	MF-$0.76 HC-$4.43 Plus Postage
DESCRIPTORS	*Comprehension; Early Childhood; Exceptional Child Research; *Language Development; Mentally Handicapped; *Mongolism; Questioning Techniques; Receptive Language; *Verbal Ability

ABSTRACT

Evaluated was the comprehension of maternal and experimentally posed Wh questions (such as what, why and who) by two 5-year-old Down's Syndrome children. Weekly taperecordings of mother-child play situations and videotapes of individual sessions with the experimenter were analyzed in terms of form, content, and appropriateness of Ss' response. Results indicated similarity with the first stage of normal children's interrogative comprehension. Findings had implications for teachers' questioning techniques. (The description of photographs used with the experimental set of Wh questions is provided in one of three appendixes). (CL)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED115042

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

RESEARCH REPORT #87

Project No. 332189
Grant No. OE-09-332189-4533 (032)

DOWN'S SYNDROME CHILDREN'S EARLY COMPREHENSION OF WH QUESTIONS ASKED IN NATURALISTIC AND EXPERIMENTAL SETTINGS

Kathleen Hesse, James Turnure and Nissan Buium
University of Minnesota
Research, Development and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

March 1975

The research reported herein was performed pursuant to a grant from the Bureau of Education for the Handicapped, U. S. Office of Education, Department of Health, Education and Welfare to the Center of Research, Development and Demonstration in Education of Handicapped Children, Department of Psychoeducational Studies, University of Minnesota. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicappped.

Department of Health, Education, and Welfare
U. S. Office of Education
Bureau of Education for the Handicapped

EC 080 488

RESEARCH, DEVELOPMENT AND DEMONSTRATION CENTER IN EDUCATION OF HANDICAPPED CHILDREN

Department of Psychoeducational Studies
Pattee Hall, University of Minnesota, Minneapolis, Minnesota 55455

The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

Down's Syndrome Children's Early Comprehension of WH Questions Asked in Naturalistic and Experimental Settings

Kathleen Heese, James Turnure and Nissan Buium

University of Minnesota

Endeavors to systematically enhance the communication skills development of retarded children must attend to many aspects of receptive and expressive language (Carroll, 1967; Miller & Yoder, 1973; Schiefelbusch, 1967). As Hymes (1961) has pointed out, a child must master several sets of rules: phonological, grammatical, semantic, and paralinguistic (expressive and persuasive speech behaviors). He must learn to judge appropriate distribution of possible utterances among roles and behavior settings.

To use the competence-performance terminology (Chomsky, 1957; Flavell & Wohlwill, 1969), a solid basis for language intervention with the retarded would be composed of competence or formallogical models of the structures (phonological, syntactical, semantic) of language, and performance or automation (Flavell & Wohlwill, 1969) models which represent psychological processes by which the abstract rules are accessed and used in real life (for example, memory factors, role perception, aim of utterance).

Furthermore, two forms of competence-performance models seem needed for language intervention programs. The terminal goals of language intervention would be characterized by models of adult competence and performance in communication (Spradlin, 1967). Such structural models seem necessary for defining "normalization" (Nirje,

1969) in language patterns of the retarded. When the probable adult environment of the mentally retarded individual differs from the normal, i.e., a sheltered workshop, its particular language demands should be analyzed (Schlanger, 1967; Spradlin, 1967).

The second form of models would include step-by-step descriptions of the development of competence and performance in language areas. Such process descriptions would give the educator a means of ordering progress, locating the point of a child's development and then providing appropriate language experiences (Rest, 1974, has suggested this approach for value education; Miller & Yoder, 1974, for language intervention).

At this time, very few parts of the suggested models exist. The phonological system of adult English has been described (Chomsky & Halle, 1968; Francis, 1968; Halle, 1964). Generative grammer has provided something of a competence model for adult syntax, but transformational grammarians have disagreed about particular aspects of the model. There has been no framework analogous to generative grammar to unify work in adult semantics. Discussion of language functions has been mostly speculative or extrapolative from other areas of psychological research (Skinner, 1957). However, in recent years, study of various situational influences on adult interpersonal communication has commenced (Rosenberg & Cohen, 1967).

Generally, the strengths and weaknesses of current knowledge about adult models have been reflected in paradigms of developmental competence and performance. A theory of phonological development

exists (Jakobson, 1968; Jakobson & Halle, 1956), but methodologically it has been difficult to test. The best described area of child language has been grammatical production. Grammars (in the transformational grammar cast) have been written to approximate the syntactical rules used by children from their early two-word utterances through sentences nearing adult performance (Brown, 1973; Brown & Bellugi, 1964; Brown, Cazden & Bellugi, 1969; Miller & Ervin, 1964). Recently, more attention has been paid to the semantic relational concepts expressed in early utterances (Bloom, 1970; Bowerman, 1973a; Schlesinger, 1971). However, extensions of this approach to later stage utterances, and research on other aspects of the child's semantics have not been as numerous (but see Clark, 1971; 1973; Donaldson & Wales, 1970). Performance factors such as egocentrism (Piaget, 1951), socio-economic status (Robinson, 1972; Robinson & Rackstraw, 1972), and goal of utterance (Halliday, 1969, 1973; Horner & Gussow, 1972) have been studied and discussed, but rarely in a way to reliably indicate developmental trends.

It should be noted that even within fairly well-described areas of language, some topics have received more attention than others. Typically, production data have been easier to obtain than that for comprehension. The syntax and semantics of declarative, and to a lesser degree, negative sentences have been focused on. The ideational or referential function of language has most often been discussed.

Thus, neither the terminus nor the guideposts for language

intervention has been detailed. Obviously, attempts to improve communication skills of retarded children must continue while the competence-performance models are still being constructed. The primary purpose of this paper, then, is to apply what is known of the competence and performance models of the language behavior of questioning, particularly as regards the comparability of such development in normal and mentally retarded children (cf. Hesse, Turnure & Buium, 1975), toward the initiation of observational and experimental research on the problem of the degree of experimental concordance of normal and retarded interrogative mode development. The findings would be expected to reflect on 1) the validity of using normal developmental data in designing language intervention programs; and 2) the timing of, and manner in which intervention might be implemented.

What is a Question?

Most generally, a question is a form of instrumental language, an utterance by which one attempts to secure action from others. The responsive action sought fills a gap in knowledge or confirms a supposition (Lewis, 1963). The question is a spontaneous search for information (Piaget, 1951). It is, then, a behavioral activity related to the acquisition of knowledge. The existence of the possibility of interrogation apparently rests on two conditions: a gap in a framework or belief, and the availability of alternatives for filling the gap (Robinson & Rackstraw, 1972). It would appear that interrogation is universal to languages (however, Katz & Postal,

1964, have mentioned that the Siouan language apparently has no interrogative sentences).

Besides the semantic content of requesting information, a question has a formal structure which normally restricts the formal structure possible in the response (Miller & Ervin, 1964). A popular, broad differentiation of questions has utilized this response--restriction aspect of the interrogative. Some questions offer 1) possibilities of confirmation or denial, or 2) two options from which to choose. No new lexical items are required to reply to a question of this first type. Such questions have been referred to as Yes-No, binary (Siegel, 1963), closed (Robinson & Rackstraw, 1972), sentence (Weinreich, 1963), or nexus-questions (Jespersen, 1940). Other questions request information to fill a particular gap which is specified by the interrogative word used. Such questions have been designated Wh, multiple Siegel, 1963), open (Robinson & Rackstraw, 1972), completion (Weinreich, 1963), or x-questions (Jespersen, 1940).

It has been hypothesized that Yes-No and Wh questions differentially locate the "heavier" cognitive burden in the speaker-respondent interaction (Cazden, 1970). That is, formulating "Did you go to work today?" requires more complicated processing than answering it. However, it is responding to "Why did you go to work today?" that is more cognitively complex. Furthermore, Robinson and Rackstraw (1972) have suggested that the probability of obtaining quick, useful closure of an information gap is greater when the question can be formulated as an open (Wh) question.

Since the span of this investigation must somehow be constrained, its range has been restricted to Wh questions, which seem pertinent to issues involved in the enhancement of cognition, and which are central to ongoing research activities (Buium & Turnure, 1974; Hesse, Turnure & Buium, 1975; Turnure, Buium & Thurlow, 1975).

Study Rationale

As noted above, there have been several calls for naturalistic and experimental studies of the language development of retardates to facilitate education of such children. Until such research becomes available, it has been suggested that an "interim" strategy might involve utilizing normal developmental trends in devising language intervention programs for the retarded (Miller & Yoder, 1974).

Some recent investigations of normal children's language development data (Brown, 1973; Lee, 1975) have revealed certain linguistic and conceptual milestones which may serve to characterize the development of interrogative reversal questions (Yes-No questions, seeking affirmation or negation of a sentence), and Wh questions (seeking information). The following are brief descriptions of such milestones, in the context of the sort of linguistic analyses which identify them (analyses of both general types of interrogatives are presented for competences sake, and to better convey the style of such analyses).

1. Interrogative reversals. Among the early formats of Yes-No type questions used by the child is the raised intonation (R.I.). At first, the R.I. is superimposed on a repeated syllable such as

"uh?" uh?" As vocabulary items are acquired, they become the carriers of the R.I.:

"Doggie?" "eat?" "cookie?"

This question morpheme may also be added to a word or a sentence:

"Doggie, huh?"

"Another cookie, ok?"

"That mine, right?"

With the development and increase in Mean length of utterance (MLU), the R.I. may be further expressed through an entire declarative sentence:

"You want that?"

"Daddy come now?"

"Me eat candy?"

The child's mastery of the interrogative reversal's correct syntactical construction is contingent upon this mastery of the verb's auxiliary system, which is, perhaps, one of the most complicated features of English. Unlike other languages where verbs are elaborated primarily by the usage of word endings (e.g., Hebrew), the English language requires the introduction of the auxiliary verb system. Although the auxiliary items' usage is optional, the sentential temporal order is invariant.

The knowledge of this system is essential to the correct syntactical construction of interrogative reversals because it is always the first auxiliary verb that is reversed with the subject NP. For example:

I am writing Am I writing?

She had written	Had she written?
I should be writing	Should I be writing?
She might have written	Might she have written?
I should have been writing	Should I have been writing?

Children's first interrogative reversal format involves the use of copula:

"Is it candy?"

"Are they here?"

As additional components of the verb phrase are acquired, the child reverses the is + verb + ing format into:

Is she writing?

Isn't he writing?

Wasn't she eating?

It is at this level of development that the obligatory "do" appears in the interrogative reversal construct. Its primary function is to form an auxiliary where there is none:

She writes	Does she write?

The "do" is transformed into "does" as it "receives" the main verb's tense marker (present, third person singular) and is reversed with the subject NP. The entire process may be conveniently described in 4 steps:

1.	No auxiliary	she eats candy
2.	Supply obligatory "do"	she do eats candy
3.	Move tense marker to obligatory "do"	she does eat candy

4. Reverse "do" and subject does she eat candy?

The next developmental level involves the usage of the mode, an optional component of the auxiliary system. The modes introduce particular meanings that are superimposed on the main verb's salient meaning:

"Can I play?"

"Shall I play?"

"Must I play?"

"May I play?"

"Will I play?"

This level is followed by the tag question construct, whose complexity is underscored by the demands on the child to know (a) interrogative reversal rules, (b) negation, (c) subject NP agreement through the sentence and (d) an occasional use of obligatory "do":

"You want candy, don't you?"

"She can do it, can't she?"

The usage of the perfective component (have + verb + en) is indicative of the child's near complete attainment of the entire interrogative reversal system:

"Have I seen you?"

"Has she eaten candy?"

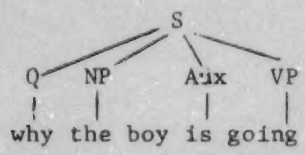
An interrogative reversal with two or three auxiliaries demonstrate the child's complete mastery of the system:

"Has she been eating candy?"

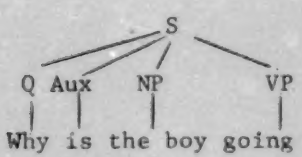
"Could she have been writing?"

2. Wh - questions. Wh type questions seek information that is not contained in the basic sentence. Such questions include words like what, how, where, why, when, how many, etc. Unlike Yes-No type questions, which are constructs subject to one transformation, the correct Wh question form necessitates two transformations: (a) the previous interrogative reversal trarsformation and (b) the preposition transformation (the inclusion of the appropriate Wh word in the initial position). For example:

(1) The preposition transformation, i.e., the inclusion of the appropriate Wh question at the beginning of the sentence.



(2) The interrogative transformation (the same as in a Yes-No question) in which the auxiliary is exchanged with the subject noun phrase.



(Buium, 1975).

Early Wh questions of parents to their children tend to maintain the S-V-O word order with a Wh replacement, thus cuing the child to specific Wh word meanings:

"you found a what?" (thing)

"you found it where?" (location)

"who found it?" (person)

The frequency of parental Wh questions reflects the order of these questions' appearance in the child's productive system. Mothers in particular tend to produce more often the Wh questions that appear in the child's language (Buium, 1975; Buium, Rynders & Turnure, 1974).

Generally, the Wh questions' appearance in the child's language reflects conceptual or semantic development (Lee, 1975). The Wh words "who" and "what" are among the early ones to emerge, reflecting an early semantic distinction between person-thing. The appearance of the location concept permits the child consistently correct comprehension and production of the "where" question. He must attain the time concept before he can consistently use "when" correctly, and casuality before the usage of "why." Thus, the normal child's developmental mastery of the Wh questions' comprehension and production is suggested (Lee, 1975) to parallel his conceptual or semantic development.

The present study was designed to speak to the suitability of "interim" research and development strategy (Miller & Yoder, 1973), ascertaining whether Down's syndrome children comprehend the same kinds of Wh questions as Stage I language (Brown, 1973) normal children under similar conditions--at home with mother. Thus, analysis of Down's syndrome child comprehension of maternal Wh questions would allow for comparison with studies of normal interrogative comprehension development (Bellugi, 1965; Bowerman, 1973a; Ervin-Tripp, 1970). This comparison could contribute to the determination of whether the Down's syndrome child at least begins language development normally. That determination might indicate the period for and method of language intervention.

However, analysis of the Down's syndrome child's comprehension of maternal Wh questions might not adequately evaluate the full extent of the child's comprehension. Many researchers of normal and retarded language development have noted that mothers produce certain language forms more frequently than other forms in the same classification (Bowerman, 1973a; Brown, 1968; Brown & Hanlon, 1970; Buium & Rynders, 1973). Specifically, it has been reported that mothers of two-year-old normal and Down's syndrome children used certain Wh questions more often than others (Buium & Rynders, 1973). It would seem that the Down's syndrome child's comprehension of certain Wh question levels of the developmental sentence scoring procedure (DSS) (Lee & Canter, 1971) might not be assessed through his responses to maternal interrogatives, because such Wh level questions appear infrequently in the maternal utterances. Hence the present study entailed a systematic presentation of questions from all Wh levels (Lee & Canter, 1971) to the child.

Testing the limits of the Down's syndrome child's comprehension has important educational implications. The Stage I normal child typically has two or three more years in the predominantly maternal linguistic environment. Berko Gleason (1973) has described some aspects of parental linguistic code switching from infant to pre-schooler. Thus, the imput available to the child as he moves out of Stage I may change. Regarding the child's output, the possible cognitive functions of post-Stage I Wh questions have been discussed by Isaacs (1930), Piaget (1951), and Robinson and Rackstraw (1972). These

cognitive functions certainly seem desirable for retarded children. However, it would seem, given the delay in onset of language production, that many Stage I language retardates frequently experience another major linguistic environment--the public school special class (this is not to ignore the fact that the teacher linguistic environments of preschools for normal and retarded children require investigation). Available research on EMR classroom language has suggested that teacher questions may either under or overestimate the child's comprehension abilities (Hurley, 1967; Stuck & Wyne, 1971). In some way, the modified code to which school-attending Stage I language retardates are exposed may not be as optimal for further language development as the one experienced by normal children at home.

The second method employed in this study addressed the question of what the Down's syndrome child comprehends of those Wh questions intended to test understanding of the Wh words. The findings might aid teachers in selecting optimally effective questions for different points in development. Also, once the child's present level of comprehension has been established, it might be easier to use developmental research to devise questions which challenge the child to progress, that is, to produce discernible mismatches between the child's "theory of the structure of the language" and the "received data" from some previously formed question.

To summarize, the purposes of this study were:

1) To acquire information on the form, content, and appropriateness of Stage I language

Down's syndrome children's responses to mothers' Wh questions at home.

2) To obtain information on the form, content, and appropriateness of these Down's syndrome children's replies to a controlled sampling of Wh question levels (Lee & Canter, 1971) asked by a non-familial, known adult at the children's preschool.

Method

Subjects

Two of three Down's syndrome children involved in a longitudinal language development study (Buium et al., 1974) produced Wh questions during the investigation. Those two children were used in this study. The two Ss were males of ages 44 and 49 months at the beginning of the longitudinal tape recording for the Buium et al. study (1974). At the time of this study's experimental presentation of Wh questions, the Ss' ages were 60 and 65 months. Stanford-Binet intelligence tests given at the age of 60 months yielded IQ scores of 40 and 54 (1972 norms).

In those tape sessions inspected for child comprehension of maternal Wh questions, the Ss' MLU's ranged from 1.45 to 1.65 morphemes. The MLU's are only approximate, since the total utterances per session were not equal between or within Ss.

Both Ss have been participants in a longterm early education program for Down's syndrome infants in an effort to maximize communi-

cation abilities. Each child in the project has been stimulated at home with an experimental curriculum on a daily basis from age six months (or less) to two and a half years. At that age, project children have entered an experimental preschool which they attend until age five years (age of admission to public education in Minnesota). Screen-out criteria for the project were 1) maternal IQ less than 75; 2) obvious gross visual or auditory impairment in child; 3) family receiving welfare funds; and 4) mosaicism (a rare form of Down's syndrome in which only some cells show a chromosomal abnormality).

Materials

During the longitudinal study (Buium et al., 1974), the mothers of the Ss had been supplied with cassette tape recorders and tape cassettes for weekly tapings.

For the experimental testing of Wh level comprehension, experimenter-written Wh questions about four black and white photographs (16.875 x 21.875 inches) from the series Visual Experiences for Creative Growth (Black, Black, Metfessel, & Theisen, 1967) were used. Photographs show children engaging in familiar actions and using common objects. The publisher's identification mumbers and short descriptions of the photographs are given in Appendix B.

The set of Wh questions was written to include most of the types cited by Lee and Canter (1971) within each Wh level of the DSS. Generally, only one exemplar of each Wh question type was included in order to keep the length of the experimental session

within the limits of the Ss' attention. However, two interrogatives of the What Noun and How + Adjective types were inserted to allow for the possibility of the Ss' not understanding a particular class word used ("food," "sound," "big," "loud").

Probe forms of each question were also written. The first probe was simply the original question with "do you think" inserted after the Wh word (or before the question to avoid awkward constructions). This probe was intended to assure the S that it was his response, not some "right answer," that was requested. The second probe was usually the occasional question form, i.e., "The boy did what?". The Wh word is not preposed in the occasional question form. For those few questions for which there could be no occasional forms, the questions were converted to statements followed by question words, i.e., "The boy is sleeping--how come?"

An effort was made to restrict the main verb of the questions to the simpler levels of the DSS categorization of main verbs (Lee & Canter, 1971). Additionally, within each Wh level the main verb levels of the questions were made as similar as possible. The Wh questions with photograph number and main verb level given are listed in Appendix B.

Procedure

The Ss' comprehension of maternal Wh questions was assessed from weekly tape recordings of mother-child play situations collected during the Buium et al. study (1974). The mothers were allowed to use their discretion in choosing the times and situations for tape

recording 60 minutes of mother-child conversation each week. The tapes were collected at the end of the week and new ones supplied.

The taped conversations analyzed in the present study were those made at and after each S's first recorded production of Wh questions. Wh questions did not appear simultaneously in the two Down's syndrome Ss' speech. Thus, there was a difference between Ss in the number of tape recordings monitored for maternal Wh questions and child responses. S_1 began asking Wh questions later in the period of data collection (Buium et al., 1974) than S_2. For S_1 seven tape recordings were analyzed; for S_2, however, 19 weekly tapes were inspected.

The Ss' comprehension of the experimental set of Wh questions was obtained as follows. Each S was tested individually at the preschool. The session lasted approximately 15 minutes for each S. The questioner was the head teacher of the preschool. The entire session was videotaped by an individual who had previously videotaped the Ss several times in their homes and at the school during formal testing sessions for the early education project. Neither S seemed to be distracted by the videotape apparatus or table microphone.

The questioner showed the S one photograph at a time, and asked the questions written for that photograph. For each photograph, the relevant questions were asked in their Wh level order. The problem of fatigue effects was recognized, but it was felt that it was more important to introduce each picture with the less complex questions in order to encourage and reinforce the S's continued participation in the task.

The questioner was allowed to probe after a lack of response, and was allowed to repeat probes when attempting to 1) elicit verbal replies after a solely gestural response, 2) regain a S's attention, 3) eliminate persistent repetition (or parroting of last words of questions). The question script for the session is given in Appendix A.

Data Analysis

For the Buium et al. study (1974), each weekly mother-child tape had been transcribed by more than one listener. The linguistic structures that listeners agreed upon in their separate transcirptions were accepted into a S's protocol. For the parameter of Wh questions, the coefficient of agreement between two listeners was .90 for transcription and classification by Wh level (Lee & Canter, 1971).

For both the mother-child tapes and the experimental session, the children's responses to Wh questions were evaluated in terms of form, content, and appropriateness. The classification system was devised for the present study. The reliability of the system has not been assessed.

Form. The Ss' responses were classified as 1) verbal; 2) no response (question followed by at least 10 seconds of silence); and, for the experimental session only, 3) nonverbal (several of the questions could be satisfactorily answered by pointing or gestural demonstration). Length of response was used to further classify the verbal and no responses as 1) one word or less (which obviously included all no responses), and 2) multiword.

Content. The one word or less replies of the Ss were analyzed using the following response categories:

1) Response types appropriate to some Wh questions:

Action (What..do)

Attribute (What Noun, How)

Color (What Noun)

Expression-Polite or Sound (What..say)

Location (Where)

Object (What)

Person or Animate (Who)

Quantity (How many)

Reason or Purpose (What..for, Why, How come)

2) Response types inappropriate for any Wh question:

Expression ("Mom," whining)

Child Question("What?" "huh?")

Refusal ("No!")

Repetition (parroting of final word(s) of maternal question)

Unintelligible Sound (not deciphered by mother, or two listeners)

No Response (question followed by at least 10 seconds of silence)

No Response Possible (on mother-child tapes--maternal statement, Yes-No question, or another Wh question).

The semantic relations expressed by the Ss' two-word responses had been analyzed in the Buium et al. investigation (1974). The coefficient of two listeners' agreement in the analysis of semantic

relations was .85. The few longer-than-two-word responses of the Ss were also analyzed in terms of semantic relations. However, this analysis involved an untested application of the semantic relations approach.

The children's nonverbal responses, in the experimental session, were recorded in terms of gestures employed (pointing, hand motions).

Appropriateness. The S's verbal response was considered an appropriate answer when it 1) conveyed a statement (versus a question or command); 2) did not consist of a refusal to answer; 3) was able to function within the same referential category as the question (see response types listed under Content and Table 3).

The S's nonverbal response during the experimental session was considered an appropriate answer if it 1) followed the question in time; 2) involved the child's pointing to an appropriate aspect of the photograph, or involved the child's physically acting out a plausible reply.

An additional parameter analyzed in the experimental session was that of the occasional question form probe. The number of such probes used was tabulated, as was the number of appropriate responses elicited by this type of probe.

Results

Child Comprehension of Maternal Wh Questions

Maternal Wh questions. For S_1, 189 maternal Wh questions were analyzed from seven weekly tapes. For S_2, comprehension of 465 maternal Wh questions in 19 sessions was noted.

Table 1 displays the number and percentage of the maternal Wh interrogatives by Wh level and by specific Wh words. Table 1 should be read as follows: the mother of S_1 produced 146 Level 1 Wh questions which were 77.25% of all Wh questions; she produced 99 What questions which were 52.38% of all Wh questions.

Table 2 presents frequency and within-level percentages of Wh word types. Table 2 should be read as follows: the mother of S_1 produced 146 Level 1 Wh interrogatives; she produced 99 What questions which were 67.81% of all Level 1 interrogatives.

Child comprehension. Table 3 presents the frequency of occurrence and percentage of 1) one word or less and 2) multiword responses for the two Ss. Table 3 should be read as follows: S_1 produced 169 one word or less responses; 89.42% of all S_1 responses were one word or less.

Tables 4 through 11 categorize and enumerate the one or less responses of the two Ss to Wh question types which they both heard. The first response category listed is the one most usually appropriate for What questions in adult usage. Beside the frequency is the percentage of all one word or less responses which fell in the appropriate category. Table 4 should be read as follows: S_1 gave 38 Object responses which were 41.76% of all one word or less responses to What questions.

Tables 12 and 13 give, for S_1 and S_2 respectively, frequency and category of one word or less responses to unique maternal Wh question types. Table 12 should be read similarly to Tables 4 through 11.

Table 1

Frequencies and Percentages for Maternal Questions by Wh Level and Type

	Mother of S_1		Mother of S_2	
	Number	% of Total	Number	% of Total
Level 1	146	77.25	317	68.17
What	99	52.38	194	41.72
What...say	13	6.88	26	5.59
What...noun	9	4.76	28	6.02
Who	25	13.23	69	14.84
Level 2	34	17.99	135	29.03
What...do	20	10.58	67	14.41
Where	13	6.88	38	8.17
How many	1	.53	28	6.02
How much	0	0	1	.21
What...for	0	0	1	.21
Level 3	0	0	5	1.08
How	0	0	2	.43
How + adj.	0	0	3	.65
Level 4	9	4.76	2	.43
How about	0	0	1	.21
How come	5	2.65	0	0
Why	4	2.11	1	.21
Level 5	0	0	6	1.29
Which	0	0	4	.86
Which...noun	0	0	2	.43
Total Questions	189		465	
Total number of Sessions	7		19	

Table 2

Frequencies and Within-Level Percentages of Maternal Questions By Wh Level and Type

	Mother of S_1		Mother of S_2	
	Number	% within level	Number	% within level
Level 1	146		317	
What	99	67.81	194	61.20
What...say	13	8.91	26	8.20
What noun	9	6.16	28	8.83
Who	25	17.12	69	21.77
Level 2	34		135	
What...do	20	58.82	67	49.63
Where	13	38.24	38	28.15
How many	1	2.94	28	20.74
How much	0	0	1	.74
What...for	0	0	1	.74
Level 3	0		5	
How	0	0	2	40.00
How + adj.	0	0	3	60.00
Level 4	9		2	
How about	0	0	1	50.00
How come	5	55.56	0	0
Why	4	44.44	1	50.00
Level 5	0		6	
Which	0	0	4	66.67
Which noun	0	0	2	33.33
Total Questions	189		465	
Total Number of Sessions	7		19	

Table 3

Frequency of Ss' Responses by Length of Response

	S_1		S_2	
	Number	% of total	Number	% of total
Length of Response				
One word or less	169	89.42	418	89.89
More than one word	20	10.58	47	10.11
Total Responses	189	100.00	465	100.00
Total Number of Sessions	7		19	

Table 4

Category Frequencies for Ss' One Word or Less

Responses to Maternal What Questions

Response Category	Number for S_1	Number for S_2
Object*	38(41.76%)	76(42.46%)
Action	4	1
Attribute	0	2
Color	0	3
Expression-Polite or Sound	1	1
Location	1	0
Person	2	2
Quantity	2	10
Reason or Purpose	0	0
Expression	2	2
Question	0	4
Refusal	3	0
Repetition	1	9
Unintelligible	20	24
No Response	4	20
No Response Possible	13	25
Total Number of 0 or 1 word responses to What questions	91	179

* Appropriate response category

Table 5

Category Frequencies for Ss' One Word or Less

Responses to Maternal What...Say Questions

Response Category	Number for S_1	Number for S_2
Expression-Polite or Sound*	4(44.44%)	16(69.57%)
Action	0	1
Attribute	0	0
Color	0	0
Location	0	1
Object	1	1
Person	0	0
Quantity	0	0
Reason or Purpose	0	0
Expression	1	0
Question	0	0
Refusal	0	0
Repetition	0	0
Unintelligible	0	0
No Response	0	4
No Response Possible	2	0
Total Number of 0 or 1 word responses to What ...say questions	9	23

* Appropriate Response Category

Table 6

Category Frequencies for Ss' One Word or Less

Responses to Maternal *What Noun* Questions

Response Category	Number for S_2	Number for S_2
Color*	2	5
Object*	1	4
Quantity*	4	0
Action	0	1
Attribute	0	0
Expression-Polite or Sound	0	0
Location	0	0
Person	0	0
Reason or Purpose	0	0
Expression	0	0
Question	0	0
Refusal	0	0
Repetition	1	4
Unintelligible	0	5
No Response	0	6
No Response Possible	0	1
Total number of 0 or 1 word responses to *What* Noun questions	8	26

* Appropriate response category

Table 7

Category Frequencies for Ss' One Word or Less

Responses to Maternal Who Questions

Response Category	Number for S_1	Number for S_2
Person*	11(50.00%)	28(43.75%)
Action	1	1
Attribute	0	0
Color	0	0
Expression-Polite or Sound	1	0
Location	0	0
Object	4	2
Quantity	0	0
Reason or Purpose	0	0
Expression	0	1
Question	0	5
Refusal	0	1
Repetition	0	4
Unintelligible	2	4
No Response	1	9
No Response Possible	2	9
Total Number of 0 or 1 word responses to Who questions	22	64

* Appropriate response category

Table 8

Category Frequencies for Ss' One Word or Less Responses to Maternal What...Do Questions

Response Category	Number for S_1	Number for S_2
Action*	1(5.56%)	7(11.67%)
Attribute	0	0
Color	0	0
Expression-Polite or Sound	0	3
Location	2	3
Object	5	8
Person	2	8
Quantity	0	0
Reason or Purpose	0	0
Expression	0	0
Question	0	1
Refusal	0	0
Repetition	0	6
Unintelligible	2	6
No Response	5	10
No Response Possible	1	8
Total Number of 0 or 1 word responses to What ...do questions	18	60

* Appropriate response category

Table 9

Category Frequencies for Ss' One Word or Less

Responses to Maternal Where Questions

Response Category	Number for S_1	Number for S_2
Location*	2(18.18%)	2(5.71%)
Action	0	3
Attribute	0	0
Color	0	0
Expression-Polite or Sound	0	0
Object	2	6
Person	0	0
Quantity	0	0
Reason or Purpose	0	0
Expression	0	3
Question	0	2
Refusal	0	0
Repetition	1	6
Unintelligible	3	2
No Response	2	5
No Response Possible	1	6
Total Number of 0 or 1 word response to Where questions	11	35

* Appropriate response category

Table 10

Category Frequencies for Ss' One Word or Less

Responses to Maternal How Many Questions

Response Category	Number for S_1	Number for S_2
Quantity*	0(0%)	1(5.26%)
Action	0	0
Attribute	0	0
Color	0	0
Expression-Polite or Sound	0	0
Location	0	0
Object	0	8
Person	1	1
Reason or Purpose	0	0
Expression	0	1
Question	0	0
Refusal	0	0
Repetition	0	0
Unintelligible	0	2
No Response	0	5
No Response Possible	0	1
Total Number of 0 or 1 word responses to How many questions	1	19

* Appropriate response category

Table 11

Category Frequencies for Ss' One Word or Less

Responses to Maternal Why Questions

Response Category	Number for S_1	Number for S_2
Reason or Purpose*	0(0%)	0(0%)
Action	2	0
Attribute	0	0
Color	0	0
Expression-Polite or Sound	0	0
Location	0	0
Object	0	0
Person	0	0
Quantity	0	0
Expression	0	0
Question	0	0
Refusal	0	0
Repetition	0	0
Unintelligible	0	0
No Response	1	0
No Response Possible	1	1
Total Number of 0 or 1 word responses to Why questions	4	1

* Appropriate response category

Table 12

Frequency and Category of S_1's One Word or Less

Responses to Unique Maternal Wh Questions

Response Category	Wh Question Type
	How Come
Reason or Purpose*	0(0%)
Action	1
Attribute	0
Color	0
Expression-Polite or Sound	1
Location	0
Object	1
Person	0
Quantity	0
Expression	1
Question	0
Refusal	0
Repetition	0
Unintelligible	0
No Response	0
No Response Possible	1
Total Number of 0 or 1 word responses to How come questions	5

* Appropriate response category

Table 13

Frequency and Category of S_2's One Word or Less Responses

To Unique Maternal Wh Questions

Response Category	Wh Question Type					
	What..for	How	How+ adj.	How About	Which	Which Noun
Action						
Attribute		0*				
Color						
Expression- *Polite or Sound*				0*		
Location						
Object					1*	1*
Person						
Quantity			2*			
Reason or Purpose	0*					
Expression						
Question						
Refusal						
Repetition		2				
Unintelligible						
No Response	1			1	2	1
No Response Possible						
Total Number of 0 or 1 word responses	1	2	2	1	3	2

* Appropriate response category

In Table 13, the appropriate category of response is denoted by an asterisk next to that frequency. Table 13 should be read as follows: for What..for questions, S_2 produced zero (0) Reason or Purpose (appropriate category) responses and 1 No Response.

Tables 14 and 15 list S_1 and S_2's multiword responses to maternal Wh questions. Those responses which seemed contextually appropriate appear on the left; seemingly inappropriate responses are on the right. Next to each appropriate utterance is the assigned semantic relation.

Child Comprehension of Experimental Set of Wh Questions

Tables 16 and 17 present the number and percentage of appropriate verbal and gestural replies of the Ss to the various Wh question levels. Table 16 should be read as follows: at Wh Level 1, five questions were asked; S_1 gave 4, or 80%, appropriate verbal replies; zero (0), or 0%, appropriate gestural replies, for total appropriate responding to 80% of the instances.

Table 18 gives the frequency of use of occasional question form probes, and the frequency with which they elicited appropriate verbal responses. Table 18 should be read as follows: S_1 was asked five occasional question form probes and gave zero (0) appropriate verbal replies to them.

The actual responses of the Ss to the questions and probes are found in Appendix B. Beside each child utterance is the response category to which the reply seemed to belong. It should be noted that the number of probes varied with the S: the questioner was

Table 14

Multiword Responses of S_1

Question Type	Appropriate	Inappropriate
What	Scott up (Agent-action) Flintstones in wawa (locative) No Scott ball (denial)	1 2 1 2 1 Scott buck Mom kool-aid Run-arou fall down
What...say	I love trash (2)(line from song) Stay st(r)eet (imperative) Here I come (introducer + agent-action)	
What noun		1 2 3
Who	Scott wawa (Locative) Grandpa cake (Agent-Object)	Okay bye
What...do		Grandpa sheep More milk
Where	Scott tractor (locative)	Cris run-arou?
How many	No responses longer than 1 word	
How come	No responses longer than 1 word	
Why	No responses longer than 1 word	

Table 15

Multiword Responses of S_2

	RESPONSES	
Question type	Appropriate	Inappropriate
What	I want food good stuff Ma I want it off I see pig cow horse bird egg (possession) I don know da ear (introducer + object) da ball high (attribution) Oh on Ses(ame) Oscar Happy cake (attribution) It a tower Orange juice (attribution) Name? I don know They're sharp (attribution) Mom book (agent-object)	Push-push up up down
What...say	Happy to Andy eye ear (all lines to songs) Happy cake to you	
What noun	eye two (in response to What song)	2 3 4 5 6 baby chicks (in response to What color)
Who	Andy school (2) (locative) Sheep baa (agent-action) Elephant away (locative)	da cake

Table 15 (continued)

Multiword Responses of S_2

Question Type	RESPONSES: Appropriate	Inappropriate
What...do	I book (agent-object) J. R. down da water outside play (location-action) bear bike (agent-object)	Cat wow doggie rrr Da bird Happy cake
Where	Andy school (locative) Here camel (introducer + object) Camel on da rock	
How many	1 2 3 1 2 3 4 5 6 7 8 9 10 1 2 foot 1 2 2 foots 1 mommy ear 1 David ear 1 2 2 1 2 3 4 5 1 2 ears	
How much		Orange juice
What...for	No responses longer than 1 word	
How	No responses longer than 1 word	
How + adj.	I four old	
Why	No responses longer than 1 word	
How about	No responses longer than 1 word	
Which	Da cake (introducer + object)	
Which noun	No responses longer than 1 word	

Table 16

Number and Percentage of S_1's Appropriate Responses to Wh Levels in the Experimental Situation

	APPROPRIATE REPLIES				
	Verbal		Gestural		Total
	Number	Percent	Number	Percent	Percent
Wh Level					
1 (5)*	4	80%	0	0%	80%
2 (5)*	2	40%	2	40%	80%
3 (4)*	2	50%	1	25%	75%
4 (3)*	0	0%	0	0%	0%
5 (3)*	0	0%	2	67%	67%

* Number in parentheses is number of questions asked from that level.

Table 17

Number and Percentage of S_2's Appropriate Responses to Wh Levels in the Experimental Situation

	APPROPRIATE REPLIES				
	Verbal		Gestural		Total
	Number	Percent	Number	Percent	Percent
Wh Level					
1 (5)*	5	100%	0	0%	100%
2 (5)*	2	40%	1	20%	60%
3 (4)*	1	25%	0	0%	25%
4 (3)*	0	0%	0	0%	0%
5 (3)	0	0%	2	67%	67%

* Number in parentheses is number of questions asked from that level.

Table 18

Frequencies of Occasional Question Probes and Subsequent Appropriate Verbal Responses

	Number of Occasional Question Probes	Subsequent Appropriate Verbal Responses
S_1	5	0
S_2	9	2

allowed repetitions of probes for attempts to 1) elicit verbal replies after a gestural response, 2) regain a S's attention, and 3) eliminate persistent repetitions or parroting (an initial problem with S_2).

Discussion

Child Comprehension of Maternal Wh Questions

Maternal Wh questions. Examination of the maternal interrogatives reveals high frequencies of occurence for the Wh types which were first to emerge in the expressive language of these Down's syndrome Ss, and of younger normal children of other investigations (Bellugi, 1965; Bowerman, 1973a; Ervin-Tripp, 1970; Lee & Canter, 1971; Miller & Ervin, 1964). The early emerging child Wh types have been What, Who, and Where questions. These longitudinally studied American Down's syndrome Ss, and normal American and Finnish children all most frequently heard maternal What questions (Bowerman, 1973a; Brown, 1968).

When the present study's frequencies for the various Wh levels are compared with those obtained two years before (Buium & Rynders, 1973), it appears that the percentage of questions at each level has not greatly changed. At ages two and four years, the Down's syndrome Ss were not frequently asked Level 1 questions. Level 4 and 5 questions were almost nonexistent in the maternal productions to the Down's syndrome and normal two-year-old infants in the short experimental play and table-setting situations (Buium & Rynders, 1973). This low frequency of Level 4 and 5 questions was also found in inspecting Broen's list (1973) of maternal questions to normal two year olds during a five minute experimental "free play" situation.

By age four and a half years, however, the present Down's syndrome Ss (together) had heard only 17 Level 4 and 5 questions in 26 (combined) hours of spontaneous mother-child conversation. The extent to which such a low occurrence of certain Wh levels deviates from the frequency in the maternal linguistic environment of normal four-year-old children has not been investigated. Longitudinal tapes of mother-normal four year child conversations were not available for the present study. Other investigations of maternal language to older (than two years) children or to other adults have not reported on question frequencies (Broen, 1973; Phillips, 1973; Snow, 1972).

However, inspection of Broen's unpublished data on maternal language to normal four or five year olds in five minute free play and storytelling periods yielded Wh level frequencies rather similar to those found for the present study. That is, approximately 75% of the Wh questions heard by normal four-or five-year-old children were Level 1 types; about 15% of the questions were from Level 2; and Levels 3 through 5 accounted for 10% (at most) of the Wh questions. It should be noted that most of the Level 1 questions to normal four or five year olds were not simple "What's this?" types, but rather were much longer, with more complex noun and verb phrases. The methods of data collection in Broen's study and the present research were quite different: short experimental sessions in a university testing room versus longitudinal tape recording at home. However, at least until longitudinal data on maternal-older child interactions are obtained, Broen's results suggest a need for restraint

in labeling a retarded child's linguistic environment as "deviant."

Maternal frequency of specific Wh types is discussed in Appendix C.

It did seem that the mothers' questions were providing a good match to the Ss' conceptual abilities. In utterances not in reply to questions, the Ss talked of objects, persons, actions, and locations. They did not speak of temporal, process, or cause-effect relationships. The second part of this study investigated the matter of the child's comprehension of the infrequently heard Wh questions about such referential categories as time, cause, and manner. However, an unexplored area is the Down's syndrome child's future production of these semantically more complex questions. The relations among the Down's syndrome child's development of temporal and casual concepts, his syntactical-semantic development of Wh questions about such matters, and maternal production of such Wh questions need to be studied. Additionally, assuming that more current and better controlled data than those of Smith (1933) and Piaget (1951) are obtained on the frequency of normal children's Level 4 and 5 questions, one might compare such frequencies with those which should be collected from older (school-age) Down's syndrome children.

Child comprehension. The overall distribution of appropriate responses conforms to the hierarchy suggested by Lee and Canter (1971) in the DSS ranking for child production of questions. The Down's syndrome Ss most frequently gave answers with appropriate semantic markers to the Wh question types which other investigators have found to be answered correctly by normal Stage I children (Bellugi, 1965;

Bowerman, 1973a; Ervin-Tripp, 1970). Again, the much poorer performance on Level 2 types, particularly What...do, is in agreement with the findings of Bellugi (1965) and Bowerman (1973b). The Down's syndrome Ss had few opportunities to respond to higher-than-Level-2 questions. As noted above, the children's spontaneous utterances yielded little evidence of representation of the pertinent referential categories. Thus, their incomprehension of interrogatives about such categories does not seem surprising. In terms of production and comprehension, these Down's syndrome Ss have only commenced the first age of questioning, and would seem much removed from that "second age" which is so involved with matters of causality (Piaget, 1951).

A general aspect of the Ss' replies to all Wh question types is the predominance of one word or less replies. Responses longer than one word most often occurred in reply to the most frequent maternal question--What types. It might be that the Ss had become accustomed to this question type, controlled the markers of appropriate responding, and thus were able to expand their responses to it.

One other striking aspect of the Ss' responses is that the Ss were not allowed to answer approximately 11% of the questions. For both Ss, approximately that percentage of questions led to the No Response Possible situation: the Wh question was followed by 1) another Wh question (sometimes a repetition, sometimes a lower Wh level question), 2) a Yes-No question, or 3) a statement (typically the answer to the question). It was not clear from the tape recordings what immediate situational factors led to these maternal

interruptions of the question-answer interaction. However, more broadly, experimental delineation and manipulation of the factors affecting maternal repetition and/or paraphrasing to language-learning children would appear quite pertinent to projects for home language intervention with the retarded.

Also unexplored is the actual effect of such question situations on the child. Broen (1973) and Snow (1972) have suggested that redundancy of maternal utterances to two year olds may give the children a second chance to process the utterance and/or additional processing time. Ervin-Tripp has hypothesized that a maternal input frame which includes a Wh question and a answer may teach the child a direct relation between a question form and the expected reply. Furthermore, if the frame is presented quite frequently, the expected reply may become a child rote routine (Ervin-Tripp, 1970). Berko Gleason has described that "language of socialization" of parents to normal four-to-five year children in which questions really only require affirmation or negation by the child, since the parent supplies the whole context. Berko Gleason suggested that such questioning might teach the child how to make conversation, and how to respond to questions.

However, it would seem that such sequences of Wh questions might teach the retarded child not to attend to Wh questions, since the information requested is in the following Yes-No question. The child might also be acquiring self-evaluations such as "Mother doesn't think I'm able to answer these questions." He is not being allowed

to test the validity of his own unexpressed answers. Finally, there is evidence for school-age EMR and normal children that PA recall for children who only listened to interrogative elaborations was poorer than that of Ss who listened and responded to interrogatives (Buium & Turnure, 1973). Furthermore, within the listening-and-responding condition, responding to Wh interrogatives produced higher recall scores than responding to Yes-No questions. Perhaps the frequent maternal sequence "What's this? Is it a ----?" is not the best way to enhance the child's recall.

Discussion of child comprehension of specific Wh types can be found in Appendix C.

Child Comprehension of Experimental Set of Wh Questions

With appropriate verbal responses as the measure of comprehension, the Ss' performance again appears to follow the semantic complexity ranking of Wh levels originally proposed by Lee and Canter (1971) for interrogative productions. The Ss' highest frequency of appropriate responding was for Wh level 1, the least complex level. This level was also the one of best performance for the Ss' comprehension of maternal Wh questions (see above).

This study also made provision for recording of gestural responses, an output channel not studied in previous research on child interrogative comprehension. The addition of appropriate gestural responses does not greatly alter the hierarchical arrangement of appropriate response percentages, except for Level 5, where the acceptance of pointing as a response resulted in the Ss'

demonstration of Which comprehension.

The Ss' comprehension of specific Wh types in the experimental situation is discussed in Appendix D.

The occasional question form was utilized as a final probe because Brown (1968) had described it, in maternal questioning, as more likely than the normal question form to elicit appropriate responses. Within this study's small sample, its frequency of eliciting appropriate responses was not impressive. However, the effectiveness of the occasional question form should, it seems, be examined in other situations.

Limitations of the Study

Finally, there are some cautions to be offered in interpreting the results of the study. First, the experimental session was conducted five months after the last tape recording had been collected for the longitudinal study (Buium et al., 1974). Thus, there was no way of ascertaining the Ss' current MLUs. In the experimental session, S_1's replies were still one and two words long. It appeared that S_2 had begun to use, at least occasionally, an article, the copular "is," and the progressive inflection on the verb ("-ing"). All of these forms have been discussed as aspects of post-Stage I language (Brown, 1973). The lack of concurrent spontaneous language samples prevents one from knowing if S_2's MLU had begun to exceed 2.00 morphemes--the dividing line between Stages I and II (Brown, 1973). In view of the very gradual increase in MLU during the longitudinal study (11 months in duration), it would seem

unlikely that S_2's MLU would have been much beyond 2.00 morphemes, if indeed that high, at the time of the experimental session. However, because of this missing information, it must be kept in mind that both Ss might technically have been beyond Stage I language at the time of the experimental questioning.

Second, the pictures and vocabulary used in this experiment were purposely chosen to maximize object, event, and vocabulary familiarity. A factor such as complexity of main verb has presumably not been a consciously controlled aspect of maternal questioning nor of the Ervin and Miller study (Ervin-Tripp, 1970) of questioning. The results of this study may partially reflect the influence of the specific pictures and words used.

Finally, the presence of pictures may have lessened the abstractness of concepts expressed by the Lee and Canter (1971) ranking of Wh types. For example, the reference to a photograph for Level 5 questions may have reduced the complexity of the Which questions by making the reference more concrete than was the intent of the Lee and Canter (1971) ranking. However, it would seem that pictures, or some concrete referents, would be a necessary condition for eliciting any type of response at all from children at this stage of cognitive and language development.

Conclusions

Analysis of the Down's syndrome Ss' comprehension of maternal and experimentally posed Wh questions has revealed a close similarity to what is known of Stage I language (Brown, 1973) normal children's

interrogative comprehension. In brief, Stage I American Down's syndrome, and American and Finnish normal children are able to produce appropriate verbal responses to Wh questions which require object, person, and location answers (Bellugi, 1965; Bowerman, 1973a; Ervin-Tripp, 1970). Generally, it has been found in the present and above-mentioned studies that Stage I children demonstrate much poorer, or lack of, comprehension of Wh questions which require action, quantity, manner, purpose, or cause responses. Contemporaneously, these children have been found to produce "information request" routines which incorporate the most frequent maternal Wh types: What, Who, and Where (Bellugi, 1965; Bowerman, 1973a; Brown, 1968; Buium & Rynders, 1973; Buium et al., 1974; Ervin-Tripp, 1970; Miller & Ervin, 1964).

The present analysis of the Down's syndrome Ss' early development of the interrogative subsystem of language would appear to support the contention of Buium et al. (1974) that generally these Down's syndrome children symbolically represent their experiences through the same modes of representation available to normal children.

Buium et al. (1974) proceeded to suggest a language intervention program in which there would be pairing of 1) presentation of syntactic rules (gradually varying in complexity) with 2) appropriate situations which reflect the semantic relational concepts concurrently available to the child. It would appear that language intervention directed at the further development of interrogatives could be aided by some additional normative data. As suggested above, the collection of frequency data on various Wh level types in mothers of post-Stage

I normal children might aid in constructing language intervention programs. Frequency counts of post-Stage I normal children's Wh questions might suggest some tentative goals for language enhancement projects.

The present Ss' gestural replies to Wh types which one might have expected to be "beyond their comprehension" have pointed to a large area for investigation. Only a few of the unexplored topics will be mentioned here. In normal and retarded children, one might attempt to determine the existence of developmental sequences of gestural and verbal responses to Wh questions. One might longitudinally view normal versus retarded language-learning children's reliance on gestural responses.

There are also some more direct educational implications which can be drawn from the present study. If a teacher's purpose in asking a question is positive feedback for either himself or his Stage I language retarded student, then the "best" types of Wh questions would seem to be those from Level 1 of the DSS (Lee & Canter, 1971). The limited comprehension of certain interrogative forms identified above also seems important in assessing the suitability of structured language programs recommended for the Stage I child which could be pretested experimentally. For example, it is predicted that a project based on listening and responding to interrogative elaborations which utilize higher than Level 1 types, i.e., the "What...do" and "why" elaborations of Turnure et al. research (1974), would not produce high recall in Stage I language retarded

students. Such a prediction seems supported by the present findings that Stage I Down's syndrome Ss could not produce the type of response required by higher Wh level questions. Such response control seems prerequisite to the semantic integration hypothesized as the factor enhancing recall (Buium & Turnure, 1974).

However, when the goal of a teacher's questioning is stimulation of the retarded child's language development, the most likely pressure point would seem to be Level 2 questions. Level 2 is not just the adjacent level: the Ss did exhibit infrequent appropriate responding to its types. Bellugi (1965) reported improved comprehension of Level 2 types in her second stage of child interrogative development. Indeed, a useful research project would be the comparison of the Level 2 interrogative comprehension by initially Stage I retardates who have or have not been exposed to a planned, concentrated presentation of teacher-asked Level 2 questions.

It would appear that the teacher of Stage I language retardates might not have to forego higher than Level 2 questioning if he is attuned to the possibility of nonverbal responses. With regard to gestural responses, a teacher might be pleasantly surprised to find that his students understood his questions and lessons and relieved to be in a position to expand and elaborate on specific communications by tracking gestures and signs.

Finally, the school would seem an appropriate base for a long-term study on the comparative effects on interrogative comprehension of systematic sequences of 1) Wh question--Yes-No question ("Why

did you do that? Did you do that because you were angry?"), verse 2) Wh question--occasional Wh question form--supplied answer ("Why did you do that? You did that why? You did that because you were angry.").

A last suggestion for research is the exploring of the applicability of the present findings to other language-learning retardates. The present Down's syndrome Ss have been the recipients of early maternal tutoring and a structured preschool experience. There is a great need for longitudinal studies of language development in other types of retarded children who have been exposed to varying degrees and types of early intervention.

References

Bellugi, U. The development of interrogative structures in children's speech. In K. Riegel (Ed.), The development of language functions. University of Michigan Language Development Program. Report #8, 1965.

Berko Gleason, J. Code switching in children's language. In T. E. Moore (Ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Black, M. H., Black, E., Metfessel, N., & Theisen, E. Visual experiences for creative growth. Columbus, Ohio: Charles E. Merrill, 1967.

Bloom, L. Language development: Form and function in emerging grammars. Cambridge, Mass.: M. I. T. Press, 1970.

Bowerman, M. Early syntactic development. Cambridge, England: Cambridge University Press, 1973. (a)

Bowerman, M. Structural relationships in children's utterances: Syntactic or semantic? In T. E. Moore (Ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973 (b)

Broen, P. The verbal environment of the language-learning child. American Speech and Hearing Monographs, 1973, #17.

Brown, R. The development of Wh questions in child speech. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 278-290.

Brown, R. A first language. Cambridge, Mass.: Harvard University Press, 1973.

Brown, R., & Bellugi, U. Three processes in the acquisition of syntax. Harvard Educational Review, 1964, 34, 133-151.

Brown, R., Cazden, C., & Bellugi, U. The child's grammar from I to III. In J. P. Hill (Ed.), Minnesota symposia on child psychology, Vol. 11. Minneapolis: University of Minnesota Press, 1969.

Brown, R., & Hanlon, C. Derivational complexity and order of acquisition in child speech. In J. R. Hayes (Ed.), Cognition and the development of language. New York: Wiley, 1970.

Buium, N. Interrogative types of parental speech to language learning children: A linguistic universal? Journal of Psycholinguistic Research, in press, 1975.

Buium, N., & Rynders, J. The early maternal linguistic environment of normal and Down's syndrome (mongoloid) language learning children. Research Report #51. Research, Development and Demonstration Center in Education of Handicapped Children, University of Minnesota, 1973.

Buium, N., Rynders, J., & Turnure, J. A semantic-relational-concepts based theory of language acquisition as applied to Down's syndrome children: Implication for a language enhancement program. Research Report #62. Research, Development and Demonstration Center in Education of Handicapped Children, University of Minnesota, 1974.

Buium, N., & Turnure, J. The universality of self-generated verbal mediators as a means of enhancing memory processes. Research Report #58. Research, Development and Demonstration Center in Education of Handicapped Children, University of Minnesota, 1974.

Carroll, J. B. Psycholinguistics in the study of mental retardation. In R. L. Schiefelbusch, R. H. Copeland, & J. O. Smith (Eds.), Language and mental retardation. New York: Holt, Rinehart & Winston, 1967.

Cazden, C. Children's questions: Their forms, functions and roles in education. Young Children, 1970, 25, 202-220.

Chomsky, N. Syntactic structures. The Hague: Mouton, 1957.

Chomsky, N., & Halle, M. The sound pattern of English. New York: Harper & Row, 1968.

Clark, E. V. On the acquisition of the meaning of "before" and "after." Journal of Verbal Learning and Verbal Behavior, 1971, 10, 266-275.

Clark, E. V. How children describe time and order. In C. A. Ferguson & D. I. Slobin (Eds.), Studies of child language development. New York: Holt, Rinehart & Winston, 1973.

Donaldson, M., & Wales, R. J. On the acquisition of some relational terms. In J. R. Hayes (Ed.), Cognition and the development of language. New York: Wiley, 1970.

Ervin-Tripp, S. Discourse agreement: How children answer questions. In J. R. Hayes (Ed.), Cognition and the development of language. New York: Wiley, 1970.

Flavell, J. H., & Wohlwill, J. F. Formal and functional aspects of cognitive development. In D. Elkind and J. H. Flavell (Eds.), Studies in cognitive development. London: Oxford University Press, 1969.

Francis, W. N. The structure of American English. New York: The Ronald Press, 1968.

Guillaume, P. The development of formal elements in the child's speech. In C. A. Ferguson & D. I. Slobin (Eds.), Studies of child language development. New York: Holt, Rinehart & Winston, 1973. (a)

Halle, M. On the bases of phonology. In J. A. Fodor & J. J. Katz (Eds.), The structure of language. Englewood Cliffs, N. J.: Prentice-Hall, 1964.

Halliday, M. A. Relevant models of language. Educational Review, 1969, 22, 26-37.

Halliday, M. A. The functional basis of language. In B. Bernstein (Ed.), Class, codes and control, Vol. 2, Applied studies towards a sociology of language. London: Routledge and Kegan Paul, 1973.

Hesse, K., Turnure, J., & Buium, N. The comprehension and production of interrogatives in the language of normal and retarded children: A review and analysis. Occasional Paper #32. Research, Development and Demonstration Center in Education of Handicapped Children, February, 1975.

Horner, V. M., & Gussow, J. D. John and Mary: A pilot study in linguistic ecology. In C. Cazden, V. P. John & D. Hymes (Eds.), Functions of language in the classroom. New York: Teachers College Press, 1972.

Hurley, O. L. Teacher language: Key to learning? Education and Training of the Mentally Retarded, 1967, 2, 127-133.

Hymes, D. H. Linguistic aspects of studying personality cross-culturally. In B. Kaplan (Ed.), Studying personality cross-culturally. Evanston, Ill.: Row, Peterson, 1961.

Isaacs, N. Appendix on children's "Why" questions. In S. Isaacs, Intellectual growth in young children. New York: Harcourt, Brace, 1930.

Jakobson, R. Childhood language, aphasia, and phonological universals. The Hague: Mouton, 1968.

Jakobson, R., & Halle, M. Fundamentals of language. The Hague: Mouton, 1956.

Jespersen, O. A modern English grammar. Vol. 5. Copenhagen: Ejnar Munksgaard, 1940.

Katz, J. J., & Postal, P. M. An integrated theory of linguistic descriptions. Cambridge, Mass.: M. I. T. Press, 1964.

Lee, L. L. Developmental sentence analysis. Evanston, Ill.: Northwestern University Press, 1975.

Lee, L. L., & Canter, S. M. Developmental sentence scoring: A clinical procedure for estimating syntactic development in children's spontaneous speech. Journal of Speech and Hearing Disorders, 1971, 36, 315-340.

Lewis, M. M. Language, thought and personality. New York: Basic Books, 1963.

McCarthy, J. J. Research on the linguistic problems of the mentally retarded. Mental Retardation Abstracts, 1964, 2, 90-96.

Miller, J. F., & Yoder, D. E. An ontogenetic language teaching strategy for retarded children. In R. L. Schiefelbusch & L. L. Lloyd (Eds.), Language Perspectives - Acquisition, Retardation and Intervention. Maryland: University Park Press, 1974.

Miller, J. F., & Yoder, D. E. An ontogenetic language teaching strategy for retarded children. Paper presented at the NICHD Conference on Language Intervention with the Mentally Retarded. Wisconsin Dells, Wisconsin, June, 1973.

Miller, W. R., & Ervin, S. The development of grammar in child language. Monographs of the Society for Research in Child Development, 1964, 29 (1), 9-34.

Nirje, B. The normalization principle and its human management implications. In R. B. Kugel & W. Wolfensberger (Eds.), Changing patterns in residential services for the mentally retarded. Washington, D.C.: President's Committee on Mental Retardation, 1969.

Phillips, J. R. Syntax and vocabulary of mothers' speech to young children: Age and sex comparisons. Child Development, 1973, 44, 182-185.

Piaget, J. The language and thought of the child. New York: The Humanities Press, 1951.

Rest, J. R. The cognitive developmental approach to morality: The state of the art. Counseling and Values, 1974, 18 64-78.

Robinson, W. P. Language and social behaviour. London: Penguin Books, 1972.

Robinson, W. P., & Rackstraw, S. J. A question of answers. Vol. 1. London: Routledge and Kegan Paul, 1972.

Rosenberg, S., & Cohen, B. D. Toward a psychological analysis of verbal communication skills. In R. L. Schiefelbusch, R. H. Copeland, & J. O. Smith (Eds.), Language and mental retardation. New York: Holt, Rinehart & Winston, 1967.

Schiefelbusch, R. L. The development of communication skills. In R. L. Schiefelbusch, R. H. Copeland, & J. O. Smith (Eds.), Language and mental retardation. New York: Holt, Rinehart & Winston, 1967.

Schlanger, B. B. Issues for speech and language training of the mentally retarded. In R. L. Schiefelbusch, R. H. Copeland, & J. O. Smith (Eds.), Language and mental retardation. New York: Holt, Rinehart & Winston, 1967.

Schlesinger, I. M. Production of utterances and language acquisition. In D. I. Slobin (Ed.), The ontogenesis of grammar. New York: Academic Press, 1971.

Siegel, G. M. Language behavior of adults and children in interpersonal assemblies. In R. L. Schiefelbusch (Ed.), Language studies of mentally retarded children. Journal of Speech and Hearing Disorders Monographs, 1963, #10.

Skinner, B. F. Verbal behavior. New York: Appleton, 1957.

Smith, M. E. The influence of age, sex, and situation on the frequency, form and function of questions asked by preschool children. Child Development, 1933, 4, 201-212.

Snow, C. E. Mothers' speech to children learning language. Child Development, 1972, 43, 549-565.

Spradlin, J. E. Procedures for evaluating processes associated with receptive and expressive language. In R. L. Schiefelbusch, R. H. Copeland, & J. O. Smith (Eds.), Language and mental retardation. New York: Holt, Rinehart & Winston, 1967.

Stuck, G. B., & Wyne, M. D. Study of verbal behavior in special and regular elementary school classrooms. American Journal of Mental Deficiency, 1971, 75, 463-469.

Turnure, J. E., Buium, N., & Thurlow, M. L. The production deficiency model of verbal elaboration: Some contrary findings and conceptual complexities. Research Report #82. Research, Development and Demonstration Center in Education of Handicapped Children, University of Minnesota, Minneapolis, 1975.

Weinreich, U. On the semantic structure of language. In J. Greenberg (Ed), Universals of language. Camgridge, Mass. M. I. T. Press, 1963.

APPENDIX A

A. 1. Description of Photographs Used With Experimental Set of Wh Questions[1]

I-10 Girl reaching for a toothbrush in a holder (in which there are several toothbrushes).

II-7 Girl eating breakfast (table set with bowls of cereal, spoons, plates of toast, glasses of milk and juice).

IV-8 Dog sleeping in a bed, boy sleeping on the floor next to bed.

V-8 Boy holding bowl from which dog is eating.

[1]The numbers cited were taken from the photographs published by Charles E. Merrill, Co., Columbus, Ohio, for the series Visual Experiences for Creative Growth (Black, Black, Metfessel, and Theisen, 1967).

A. 2. Experimental Set of Wh Questions With Main Verb Level and Photograph Specified

Wh Level		Main Verb[1] Level	Photograph[2]
1	What is the girl eating?	2	II-7
	Who is feeding him?	2	V-8
	Who is he feeding?	2	V-8
	What sound does a dog make?	4	IV-8
	What food do you like?	4	II-7
2	Where is the dog?	1	IV-8
	What is the boy doing?	2	IV-8
	How many glasses are there?	3	II-7
	How much juice can you drink?	4	II-7
	What is a bed for?	1	IV-8
3.	When will the boy wake up?	4	IV-8
	How do you brush your teeth?	4	I-10
	How big is the girl's toothbrush?	1	I-10
	How loud can the dog bark?	4	IV-8
4.	Why is the dog eating?	2	V-8
	How come the boy is sleeping?	2	IV-8
	What if his mommy comes?	3	IV-8

[1]Main verb levels determined through application of Main verb ranking of DSS(Lee & Canter, 1971).

[2]See A. 1. for description of photographs.

A. 2. Continued

Wh Level		Main Verb[1] Level	Photograph[2]
5.	Which toothbrush is her daddy's?	1	1-10
	Which is the girl's?	1	1-10
	Whose dog is it?	1	V-8

A. 3. Question Script for Experimental Session[1]

Alright, name, today we are going to look at some pictures. We will look at a picture, and I will ask you questions about the picture. I want you to answer my questions. Okay?

PUT PICTURE II-7 (girl eating breakfast) ON EASEL

Look at the picture carefuily.

Tell me, what is the girl eating?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, what do you think the girl is eating?

IF STILL NO RESPONSE, ASK:
Tell me, the girl is eating what?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what is the girl eating?

Tell me, what food do you like?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Think about it...Tell me, what food do you like?

IF STILL NO RESPONSE, ASK:
Tell me, you like what food?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what food do you like?

---

[1]Directions to tester are capitalized, utterances of tester to S are in normal type.

A. 3. (Continued)

Tell me, how many glasses are there?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, how many glasses do you think there are?

IF STILL NO RESPONSE, ASK:
Tell me, there are how many glasses?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, how many glasses are there?

Tell me, how much juice can you drink?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, how much juice do you think you can drink?

IF STILL NO RESPONSE, ASK:
Tell me, you can drink how much juice?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, how much juice can you drink?

PUT PICTURE IV-8 (dog in bed) ON EASEL

Look at the picture carefully.

Tell me, where is the dog?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, where do you think the dog is?

IF STILL NO RESPONSE, ASK:
Tell me, the dog is where?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me where is the dog?

A. 3. (Continued)

Tell me, what is the boy doing?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, what do you think the boy is doing?

IF STILL NO RESPONSE, ASK:
Tell me, the boy is doing what?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what is the boy doing?

Tell me, what is a bed for?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, what do you think a bed is for?

IF STILL NO RESPONSE, SAY:
Tell me, a bed is for what?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what is a bed for?

Tell me, when will the boy wake up?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, when do you think the boy will wake up?

IF STILL NO RESPONSE, ASK:
Tell me, the boy will wake up when?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, when the boy will wake up?

A. 3. (Continued)

Tell me, how come the boy is sleeping?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me what you think--how come the boy is sleeping?

IF STILL NO RESPONSE, ASK:
Tell me, the boy is sleeping--how come?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, how come the boy is sleeping?

Tell me, what if his mommy comes?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me what you think--what if his mommy comes?

IF STILL NO RESPONSE, ASK:
Tell me, if his mommy comes--what?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what if his mommy comes?

PUT PICTURE I-10 (girl with toothbrush) ON EASEL

Look at the picture carefully.

Tell me, how do you brush your teeth?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Think about it. Tell me, how do you brush your teeth?

IF STILL NO RESPONSE, ASK:
Tell me, you brush your teeth how?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, how do you brush your teeth?

A. 3. (Continued)

Tell me, how big is the girl's toothbrush??

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, how big do you think the girl's toothbrush is?

IF STILL NO RESPONSE, ASK:
Tell me, the girl's toothbrush is how big?

IF ONLY GESTURAL RESPONSE, SAY:
Good. You showed me. Now tell me, how big is the girl's toothbrush?

Tell me, which toothbrush is her daddy's?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, which toothbrush do you think is her daddy's?

IF STILL NO RESPONSE, ASK:
Tell me, her daddy's is which toothbrush?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, which toothbrush is her daddy's?

Tell me, which is the girl's?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, which do you think is the girl's?

IF STILL NO RESPONSE, ASK:
Tell me, the girl's is which?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, which is the girl's?

A. 3. (Continued)

PUT PICTURE V-8 (boy feeding dog) ON EASEL

Look at the picture carefully.

Tell me, who is he feeding?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, who do you think he is feeding?

IF STILL NO RESPONSE, ASK:
Tell me, he is feeding who?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, who is he feeding?

Tell me, what sound does a dog make?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, what sound do you think a dog makes?

IF STILL NO RESPONSE, ASK:
Tell me, a dog makes what sound?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, what sound does a dog make?

Tell me, who is feeding him?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, who do you think is feeding him?

IF STILL NO RESPONSE, ASK:
Tell me, who is feeding him?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, who is feeding him?

A. 3. (Contunued)

Tell me, how loud can the dog bark?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, how loud do you think the dog can bark?

IF STILL NO RESPONSE, ASK:
Tell me, the dog can bark how loud?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, how loud can the dog bark?

Tell me, why is the dog eating?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, why do you think the dog is eating?

IF STILL NO RESPONSE, ASK:
Tell me, the dog is eating--why?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, why is the dog eating?

Tell me, whose dog is it?

IF NO RESPONSE, "I DON'T KNOW," OR "WHAT?" ASK:
Tell me, whose dog do you think it is?

IF STILL NO RESPONSE, ASK:
Tell me, it is whose dog?

IF GESTURAL RESPONSE ONLY, SAY:
Good. You showed me. Now tell me, whose dog is it?

APPENDIX B

Ss' Responses to Wh Questions and Probes[1]

Level 1 Questions	S_1	S_2
What is the girl eating?	1) bread (Object)*	1) eating (Repetition) 2) eating (Repetition) 3) da girl eating. milk cereal spoon toast (Object)*
Who is feeding him?	1) No response 2) No response 1) No response	1) RRR (Expression-Sound) 2) doggie eating (Agent-Action) 1) da boy (Person)*
Who is he feeding?	1) Pointed to dog 1) doggie (Person or Animate)*	1) Pointed to dog 1) da dog (Person or Animate)*
What food do you like?	1) beebies (Rice Crispies)	1) like milk toast cereal (Person affected)*
What food do you like?	toast milk (Object)	
What sound does a dog make?	1) No response 1) RRR (Expression-Sound)*	1) a doggie noise* 2) a doggie noise* 3) a doggie sound (Attribution)*

[1] 1) is response to normal form; 2) is response to normal form with insertion of "do you think;" 3) is response to occasional question form.

*Accepted as an appropriate response

Ss' Responses (Continued)

Level 2 Questions	S_1	S_2
Where is the dog?	1) Pointing* plus Lassie	1) Pointing* plus dog
What is the boy doing?	1) Folded hands together, leaned head on them; closed eyes, snored.* 2) See 1). 2) See 1).	1) boy. dog bed. (Person, Locative) 2) boy (Repetition) 3) boy (Repetition) 1) boy doing (Repetition) 3) sleep (Action)*
How many glasses are there?	1) Pointed to toast 2) Pointed to glass 2) 1 2 3 (Quantity)*	1) girl eating (Agent-Action) 2) da girl eating milk toast(Agent-Action-Object)
How many glasses are there?		3) glass plus pointing (Object)
How much juice can you drink?	1) Pointed to glass plus drinking gesture 2) See 1)	1) drink (Repetition) 2) drink (Repetition) 3) orange juice (Attribution)
What is a bed for?	1) doggie (Person or Animate)*	1) a doggie (Person or Animate)*
Level 3 Questions		
When will the boy wake up?	1) Wake up! (Imperative) 2) doggie night-night (Agent-Action) 3) See 1).	1) da boy. Get up! (Imperative) 2) See 1). 3) See 1).

Ss' Responses (Continued)

Level 3 Questions	S_1	S_2
How do you brush your teeth?	1) Used finger to brush teeth*	1) No response 2) toothbrush brushing* (Object, Action)
How big is the girl's toothbrush?	1) Dat big plus showing a length with thumb and finger.*	1) da girl's toothbrush (Repetition) 2) See 1).
How loud can the dog bark?	1) Series of RRR's which increased from loud to louder.*	1) Several loud RRR's.*
Level 4 Questions		
Why is the dog eating?	1) beebies (Object) 2) da dog (Person or Animate) 3) Pointed to dog and RRR (Expression-Sound)	1) da dog eating (Repetition) 2) See 1). 3) See 1).
How come the boy is sleeping?	1) No response 2) Doggie plus gesture for sleep 3) Wake up! (Imperative)	1) Da boy is sleeping (Repetition) 2) See 1). 3) See 1).
What if his mommy comes?	1) No response 1) uh oh (Expression) at home (Locative)	1) my mommy (Possessive) 2) da mommy (Demonstrative) 3) da boy is sleeping (Agent-Action)

Ss' Responses (Continued)

Level 5 Questions	S_1	S_2
Which toothbrush is her daddy's?	1) daddy go home (Agent-Action) 2) go work (Locative) 1) Pointed to a toothbrush	1) No response 2) Pointed to toothbrush* plus saying da daddy's toothbrush
Which is the girls'?	1) No response 2) Pointed to a toothbrush* plus saying tooeeth	1) Pointed to a toothbrush* plus saying da girl's teeth 2) da dog eating (Agent-Action)
Whose dog is it?	1) beebies (Rice Crispies) Answer not probed- tester neard as "baby's"	3) dog eating (Agent-Action) 1) No (Refusal)

APPENDIX C

C. 1. Discussion of Specific Wh Types

In Maternal Questions

What, Who, and Where questions were consistently, as well as frequently, asked through all sessions. There was some internal growth in the complexity of these questions. In later sessions, instead of "What's this?", "Who's this?", and "Where's your book?", the child was occasionally subjected to "What are these long prickly things sticking out from the lion's face?", "Who did the King's men take into the castle to chase the mice away?", and "Where did you put the cheese book after you read it on Saturday?"

What ... do questions did not appear until midway in both Ss' tapes.

How many interrogatives appeared earlier and more frequently in the maternal productions to S_2. The mother of S_2 seemed, to this auther, to more often use conversation for didactics. "What's this?" often meant teaching new words: midway through the study, the focus seemed to switch to number concepts. The mother of S_1 less frequently, it appeared, assumed the teaching stance. Moreover, when the mother of S_1 did "teach," her number concepts questions were more often "What number comes after x?"

Beyond Level 2 types, the maternal questions produced appeared indicative of individual maternal styles and interests. S_1's mother asked several casual questions which probed S_1's reasons for certain (mis) deeds. The two How + adjective questions produced by the mother of S_2 were both "How old are you?" At about the same time,

this mother had begun asking the child "Who are you?" Both questions require personal information answers which parents of normal and retarded preschoolers teach their children for safety purposes. $\underline{S_2}$'s mother rather infrequently allowed $\underline{S_2}$ some choice in his activities through Which questions.

Finally, it should be noted that neither mother ever asked her Down's syndrome child a When question during the sessions. One wonders not only about the effects of this low frequency on the child's When question acquisition, but also on the reasons behind such an omission. In regard to acquisition, Cromer, as cited in Ervin-Tripp (1970), has found that many time concepts did not develop until after age four in normal children, no matter how often such concepts were represented in the mothers' speech. With respect to reasons for omission, it might be that the mothers of Down's syndrome Ss unconsciously judge temporal interrogatives, at this point, to be beyond the children's understanding. Such an assumption about the child's comprehension has been supported by the work of Clark (1973) and Ervin-Tripp (1970) with Stage I language normal children. From the available tapes, it could be ascertained that the Down's syndrome Ss responsed inappropriately or not at all to temporal phrases, such as "not until supper," or "yesterday." Alternatively or additionally, it might be that the mothers judge responsible control of time as not within their children's capabilities. That is, the children were asked what, but not when, they wanted to eat; what, but not when, they wanted to do something.

C. 2. Discussion of Child Comprehension of Specific Maternal Types Within Wh Question Levels

Level 1

In terms of giving responses with the appropriate semantic features, the Ss' best performance was with Level 1 questions. Since frequency counts are not available for the appropriate responding of normal Stage I language children, it cannot be ascertained if the Down's syndrome Ss were any more or less consistent than normal children. Some of the present Ss' "failures" appeared due to a lack of vocabulary. Subjectively, that seems the best explanation for the high frequency of unintelligible responses for S_2, whose speech was usually clear. Most of his unintelligible replies occurred when the "naming game" entered unfamiliar territory--new picture books, for instance. At least for What questions, S_2's solution to not having the appropriate word appeared to be "jabber with expression." It was late in the study that he indicated lack of vocabulary with "Name? I don know."

The responses to What noun (mostly number, color) demonstrated some interactions of the child's vocabulary, rote memory, and concept formation. S_1, for example, responded appropriately to several What number questions with a rote reply. However, one could not be certain of his understanding of either number or color, since he also responded with numbers to What color questions. S_2 was asked more What color questions. Most of his No Responses, Repetitions, and Unintelligibles came from early sessions in which he gave little

C. 2. (Continued)

evidence, at anytime, of being able to name colors.

Level 2

Several different factors could be at the base of the much poorer comprehension of the three Level 2 type questions asked of both Ss. Place, action, and quantity may be more semantically complex than object and person, as Lee and Canter (1971) assumed. Also involved, however, may be maternal use of such questions as adult psycholinguist projections onto child language.

In Ervin-Tripp's study (1970), the locative feature for Where responses was controlled very early by all five children studied. However, most of the Down's syndrome mothers' Where questions were not so much location as recognition (where = show me) requests. In the early sessions, many of these Where questions were followed by the child's naming the object and evidently pointing to it. In the last few sessions, S_2 responded to such recognition tests with "Here ____" or "Da ____ on location." However, when he was asked Where questions which called for location and memory--"Where did you put your shoes last night?"--he did not respond.

If the Ss' comprehension of What...do questions is measured solely by the number of action word or Verb Phrase replies, then it is low, as Bellugi (1965) and Bowerman (1973b) found for Stage I American and Finnish normal children. In contrast, What...do was listed as one of the question types first answered in Ervin-Tripp's report (1970). A partial explanation of the contradictory

findings may reside in Ervin-Tripp's dicussion (1970) of determining the child's sense of an appropriate answer. For the Stage I child, a particle or object ("socks on," "Bonnie bath") may serve as a predicate. Several of S_2's multiword replies to What... do questions matched this description for "verbless predicates."

Beyond this definitional problem are variables of memory, interest level of child, and available language functions. The action word responses of both Ss came from What...do questions dealing with immediate events--"What will you do outside?"--or recent, important actions--"What did you do at Grandpa's?" The frequent "What did you do at school today?" collected the most inappropriate and nonresponses. It would seem that the lack of responses to that particular question might also stem from the child's inability to use language to convey new information. Halliday (1973) has stated that this "informative" or "representational" function of language, for the young child, is a relatively minor one, late in emerging. It was briefly reported that by age 21 months, the informative function had still not emerged in the child whose language function development Halliday had been following for a year.

How many questions were heard relatively frequently by S_2 after the midpoint of the analyzed sessions. Typically, the mother of S_2 would ask several How many questions sequentially. S_2's responses seemed to display a "fatigue" factor. His responses to the first few How many questions in a series were appropriate, multiword utterances. However, later How many questions were answered not at all, or with Object responses. The latter seemed to be an effort by S_2 to turn the relatively new "counting game" into the

more familiar "naming game."

S_2 had one How much and one What...for question to which to respond. It may be that "How much juice..." was interpreted by him as "What kind of juice..." but one cannot conclude this from a single instance.

Level 3

S_2 listened to two How questions ("How does it feel?") which could be classified as state or adjectival types (Robinson and Rackstraw, 1972). Presumably, the mother of S_2 was teaching attribute vocabulary as she had occasionally attempted to do earlier through sequences such as "What is ice cream? It's cold, isn't it?"

S_2's replies to "How old are you?" varied: "5," "4," "I four old." However, they all appeared to indicate some type of answer routine for that specific quantity question. Such performance seems a likely candidate for a result obtained through maternal use of question--supplied answer input frames (Ervin-Tripp, 1970).

Level 4

Although both Ss heard casual questions, S_1 heard most of them (5 How come, 4 Why). Again, it is an exceedingly small base from which to generalize, but if one looks only at the four casual questions asked about the S's immediate actions (why he wanted his mother to come downstairs, or how come he wanted the dolls to fight), three of his responses were desired-action words--"walk," "kick!"

In view of S_1's contemporaneous poor performance on What... do questions, it would seem unlikely that he was hearing and responding to Why or How come as What...do questions. One wishes that more maternal causal questions has been produced, so that one could discover if S_1 had begun to develop an awareness of juxtaposition of events which Lewis (1963) and Piaget (1951) have described as a forerunner of causal concepts in the child.

A comment would seem in order about the How about + gerund question type. To this author, it would seem that this form is a Wh question only by grace of its initial word. Directed to an adult, it may actually be a suggestion or a Yes-No question. "Asked" of a child, it seems to basically be a polite imperative.

Level 5

Two of S_2's responses to six Which questions were definitely appropriate:

Mother: Which do you want?
Child: Da cake (when the choice was cake or cookies)

Mother: Which animal is that?
Child: Lion.

In the first case, the outcome was of some importance to S_2; in the second, the animal in question was well-known to him. According to Lee and Canter (1971) this type of question is the last to be produced by children. It may be that with more questions of this type, S_2's performance would have shown deterioration. Alternatively, Which and Whose comprehension may develop early, but the need or

opportunity to produce may occur only much later. Support for such an alternative is rather sparse. The only studies of normal children to report on Level 5 questions have been the work of Ervin-Tripp (1970) and Guillaume (1973). For both studies, the question type discussed was Whose. Four of the five children studied longitudinally by Miller and Ervin controlled the possessive, animate Noun Phrase marking for Whose by age 2;3 (Ervin-Tripp, 1970). Guillaume reported that at age 17 months, a French child showed understanding of Whose questions by replies which gave someone's name. Once again, this is an area where further studies of normal children's comprehension could aid the understanding of the retarded child's status.

C. 3. Discussion of Child Comprehension in Experimental Session by Wh Question Level

The experimental design did not allow for a sampling of specific Wh types large enough to warrant conclusions about child comprehension of each Wh type. However, some of the more interesting/surprising responses deserve comment.

Level 1

In recognition of the differential difficulty suggested by Ervin-Tripp's results (1970), both Who-suggest and Who-object questions were asked. The Who-subject question was the only one at Level 1 not answered by S_1. He did not even make the mistake of naming the object, a rather common early mistake for Ervin-Tripp's Ss (1970). Both Ss responded correctly to the Who-object question, which seems in agreement with Ervin-Tripp's report (1970) that her youngest Ss (up to CA 3;0) gave appropriate responses if they replied at all.

Level 2

Both Ss answered the Where question as if it were a "show me" request--the Ss pointed and labelled the object. This occurred despite the fact that the Ss' spontaneous (not in response to a question) speech indicated possession of an appropriate place word, "bed."

An amusing gestural performance by S_1 came in response to the first posing of the What...do question. He persisted in the solely gestural response even though in spontaneous utterances he had used the form "night-night" as a verb. What was most interesting in these

circumstances for S_2 was that before any questions were asked, he had spontaneously described the picture as "Dog. Da boy is asleep." Yet, a few minutes later, S_2's sparse verbal response "Sleep" was elicited only after several probes.

The surprising point about the How many question performance was that it was S_1, the child who had heard fewer How many questions, who gave a quantity response.

The Ss did not give the "expected" purpose response to the What...for question, that is, that a bed is for sleeping. However, the Ss' response "dog" seemed entirely appropriate to the immediate situation.

Level 3

Neither S had heard When or How (manner) questions during the taped mother-child conversations. Both Ss responded to the When question with imperatives to the pictured child. Ervin-Tripp (1970) had reported that imperatives as answers were rare at all ages for her Ss. Neither of the Down's syndrome Ss gave the location responses reported as early replies by Clark (1971) and Ervin-Tripp (1970). The How (manner) question did elicit appropriate responses. In particular, S_1's demonstration of toothbrushing was informative enough to be used for instructional purposes.

It should be noted that the Ss' "appropriate" replies to the How + adjective questions could be more simply interpreted as appropriate reactions to the intonationally stressed concept words.

Level 4

Neither S gave an appropriate response to any of the three questions from this level. "Because," an early, common reply in Ervin-Tripp's protocols (1970) was not offered by either S. However, there was no evidence to suggest that either S had that word in his expressive vocabulary yet.

Center Publications

Copies of Center publications which are still in print may be purchased at the rate of $1.00 for the first report and $.75 for each additional report per order. Only checks and money orders made payable to the University of Minnesota can be accepted. All orders must be prepaid.

All foreign patrons desiring air mail shipping will be billed for this cost with their order. If air mail is not specified, the Center will ship foreign orders by surface mail.

Requests should be directed to:

Editor
Minnesota Research, Development and Demonstration
Center in Education of Handicapped Children
11 Oak Street, S.E.
University of Minnesota
Minneapolis, Minnesota 55455

_____ M. Thurlow, J. Turnure, A. Taylor, P. Krus, R. Howe, & J. Troup. An assessment of the effectiveness of the Money, Measurement and Time Program for EMR children. Research Report #88. March 1975.

_____ K. Hesse, J. Turnure, & N. Buium. Down's syndrome children's early comprehension of WH questions asked in naturalistic and experimental settings. Research Report #87. March 1975.

_____ M. Thurlow, R. Howe, P. Krus, A. Taylor, & J. Turnure. Time with the Calendar Unit: A formative evaluation. Research Report #86. February 1975.

_____ M. Thurlow, P. Krus, R. Howe, A. Taylor, & J. Turnure. Measurement of Length Unit: A formative evaluation. Research Report #85. February 1975.

_____ P. Krus, R. Howe, M. Thurlow, A. Taylor, & J. Turnure. Time with the Clock Unit: A formative evaluation. Research Report #84. February 1975.

_____ K. Hesse, J. Turnure, & N. Buium. The comprehension and production of interrogatives in the language of normal and retarded children: A review and analysis. Occasional Paper #32. February 1975.

_____ B. Egeland, R. Wozniak, & A. Thibodeau. Visual information processing training program experimental version. Development Report #3. January 1975.

_____ R. Hoffmeister, D. Moores, & R. Ellenberger. The parameters of sign language defined: Translation and definition rules. Research Report #83. January 1975.

_____ J. Turnure, N. Buium, & M. Thurlow. The production deficiency model of verbal elaboration: Some contrary findings and conceptual complexities. Research Report #82. January 1975.

_____ D. Moores, K. Weiss, & M. Goodwin. Evaluation of programs for hearing impaired children: Report of 1973-74. Research Report #81. December 1974.

_____ D. Moores, S. Fisher, & M. Harlow. Post-secondary programs for the deaf: VI. Summary and Guidelines. Research Report #80. December 1974.

_____ M. Harlow, S. Fisher, & D. Moores. Post-secondary programs for the deaf: V. Follow-up Data Analysis. Research Report #79. December 1974.

_____ R. Wozniak. Psychology and education of the learning disabled child in the Soviet Union. Research Report #78. December 1974.

_____ M. Thurlow, P. Krus, R. Howe, A. Taylor, & J. Turnure. Measurement of Weight Unit: A formative evaluation. Research Report #77. December 1974.

_____ M. Thurlow, P. Krus, R. Howe, A. Taylor, & J. Turnure. Money Unit: A formative evaluation. Research Report #76. December 1974.

_____ M. Harlow, D. Moores, & S. Fisher. Post-secondary programs for the deaf: IV. Empirical Data Analysis. Research Report #75. December 1974.

_____ C. Mueller & S. Samuels. Initial field test and feasibility study of the hypothesis/test word recognition procedures in the special education classroom. Research Report #74. December 1974.

_____ P. Krus, M. Thurlow, J. Turnure, & A. Taylor. Summative evaluation of the Time with the Clock Unit of the Money, Measurement and Time Program. Research Report #73. October 1974.

_____ P. Krus, M. Thurlow, J. Turnure, & A. Taylor. Summative evaluation of the Measurement of Weight Unit of the Money, Measurement and Time Program. Research Report #72. October 1974.

_____ P. Krus, M. Thurlow, J. Turnure, & A. Taylor. Summative evaluation of the Measurement of Length Unit of the Money, Measurement and Time Program. Research Report #71. October 1974.

_____ P. Krus, M. Thurlow, J. Turnure, & A. Taylor. Summative evaluation of the Money Unit of the Money, Measurement, and Time Program. Research Report #70. October 1974.

_____ P. Krus, M. Thurlow, J. Turnure, A. Taylor & R. Howe. The formative evaluation design of the Vocabulary Development Project. Occasional Paper #31. October 1974.

_____ D. Krus, K. Balcar & P. Bland. ECHO: A computer based test for the measurement of individualistic, cooperative, defensive and aggressive modes of behavior. Occasional Paper #30. September 1974.

_____ J. Rynders, J. Horrobin, L. Wangsness & J. Swanson. The severe nature of verbal learning deficits in preschool Down's syndrome (Mongoloid) children. Research Report #69. August 1974.

_____ R. Riegel. Reliability of children's sorting strategies using alternative forms of the SORTS test. Research Report #68. August 1974.

_____ S. Fisher, D. Moores, & M. Harlow. Post-secondary programs for the deaf: III. Internal view. Research Report #67. September 1974.

____ W. Bart. A set-theoretic model for the behavioral classification of environments. Occasional Paper #29. July 1974.

* D. Krus, W. Bart & P. Airasian. Ordering theory and methods. Occasional Paper #28. July 1974.

____ B. Egeland & A. Thibodeau. Selective attention of impulsive and reflective children. Research Report #66. July 1974.

____ R. Hoffmeister, B. Best & D. Moores. The acquisition of sign language in deaf children of deaf parents: Progress Report. Research Report #65. June 1974.

____ P. Krus. Use of family history data to predict intellectual and educational functioning longitudinally from ages four to seven. Research Report #64. June 1974.

____ P. Krus. Analyzing for individual differences in evaluating compensatory education programs. Occasional Paper #27. June 1974.

____ J. Rondal. The role of speech in the regulation of behavior. Research Report #63. June 1974.

____ N. Buium, J. Rynders & J. Turnure. A semantic-relational-concept based theory of language acquisition as applied to Down's syndrome children: Implication for a language enhancement program. Research Report #62. May 1974. (Journal of Speech and Hearing Disorders, in press)

____ S. Fisher, M. Harlow, & D. Moores. Post-secondary programs for the deaf: II. External view. Research Report #61. March 1974.

____ D. Moores, M. Harlow, & S. Fisher. Post-secondary programs for the deaf: I. Introduction and overview. Research Report #60. February 1974.

____ D. Krus. Synopsis of basic theory and techniques of order analysis. Occasional Paper #26. April 1974.

____ S. Samuels, J. Spiroff & H. Singer. Effect of pictures and contextual conditions on learning to read. Occasional Paper #25. March 1974.

____ A. Taylor, M. Thurlow, & J. Turnure. Elaboration as an instructional technique in the vocabulary development of EMR children. Research Report #59. March 1974.

____ N. Buium & J. Turnure. The universality of self-generated verbal mediators as a means of enhancing memory processes. Research Report #58. January 1974.

____ D. Moores, K. Weiss & M. Goodwin. Evaluation of programs for hearing impaired children: Report of 1972-73. Research Report #57. December 1973.

_____ J. Turnure, W. Charlesworth, D. Moores, J. Rynders, M. Horrobin, S. Samuels, & R. Wozniak. American Psychological Association Symposium Papers. Occasional Paper #24. December 1973.

_____ N. Buium. Interrogative types of parental speech to language learning children: a linguistic universal? Research Report #56. December 1973.

_____ D. Krus. An outline of the basic concepts of order analysis. Occasional Paper #23. February 1974.

_____ D. Krus. Order analysis: A fortran program for generalizable multidimensional analysis of binary data matrices. Occasional Paper #22. November 1973.

_____ W. Bart. The pseudo-problem of IQ. Occasional Paper #21. October 1973.

_____ J. Turnure & M. Thurlow. Verbal elaboration and the enhancement of language abilities in the mentally retarded: The role of interrogative sentence-forms. Occasional Paper #20. October 1973. (Proceedings of the International Association for the Scientific Study of Mental Deficiency, in press.)

_____ P. Dahl, S. Samuels & T. Archwamety. A mastery based experimental program for teaching poor readers high speech word recognition skills. Research Report #55. September 1973.

_____ R. Riegel, F. Danner & L. Donnelly. Developmental trends in the generation and utilization of associative relations for recall by EMR and non-retarded children: The SORTS test. Research Report #54. August 1973.

_____ R. Hoffmeister & D. Moores. The acquisition of specific reference in the linguistic system of a deaf child of deaf parents. Research Report #53. August 1973.

_____ W. Bart & M. Smith. An interpretative framework of cognitive structures. Occasional Paper #19. June 1973.

_____ C. Clark & J. Greco. MELDS (Minnesota Early Language Development Sequence) glossary of rebuses and signs. Occasional Paper #18. June 1973.

_____ J. Turnure. Interrelations of orienting response, response latency and stimulus choice in children's learning. Research Report #52. May 1973.

_____ S. Samuels & P. Dahl. Automaticity, reading and mental retardation. Occasional Paper #17. May 1973.

_____ S. Samuels & P. Dahl. Relationships among IQ, learning ability, and reading achievement. Occasional Paper #16. May 1973.

_____ N. Buium & J. Rynders. The early maternal linguistic environment of normal and Down's syndrome (Mongoloid) language learning children. Research Report #51. May 1973. (American Journal of Mental Deficiency (with Turnure), July 1974, 79, 52-58.)

____ T. Archwamety & S. Samuels. A mastery based experimental program for teaching mentally retarded children word recognition and reading comprehension skills through use of hypothesis/test procedures. Research Report #50. May 1973.

____ W. Bart. The process of cognitive structure complexification. Research Report #49. April 1973.

* ____ B. Best. Classificatory development in deaf children: Research on language and cognitive development. Occasional Paper #15. April 1973.

____ R. Riegel, A. Taylor & F. Danner. The effects of training in the use of grouping strategy on the learning and memory capabilities of young EMR children. Research Report #48. April 1973.

____ J. Turnure & M. Thurlow. The latency of forward and backward association responses in an elaboration task. Research Report #47. March 1973.

____ R. Riegel & A. Taylor. Strategies in the classroom: A summer remedial program for young handicapped children. Occasional Paper #14. March 1973.

____ D. Moores. Early childhood special education for the hearing impaired. Occasional Paper #13. February 1973.

* ____ R. Riegel & A. Taylor. A comparison of conceptual strategies for grouping and remembering employed by educable mentally retarded and non-retarded children. Research Report #46. February 1973. (American Journal of Mental Deficiency, March 1974, 78, 592-598.)

____ J. Rynders. Two basic considerations in utilizing mothers as tutors of their very young retarded or potentially retarded children. Occasional Paper #12. January 1973.

____ R. Bruininks, J. Rynders & J. Gross. Social acceptance of mildly retarded pupils in resource rooms and regular classes. Research Report #45. January 1973. (American Journal of Mental Deficiency, January 1974, 78, 377-383.)

____ J. Turnure & M. Thurlow. The effects of interrogative elaborations on the learning of normal and EMR children. Research Report #44. January 1973.

____ J. Turnure & S. Samuels. Attention and reading achievement in first grade boys and girls. Research Report #43. November 1972. (Journal of Educational Psychology, 1974, 66, 29-32).

* ____ R. Riegel, A. Taylor, S. Clarren, & F. Danner. Training educationally handicapped children to use associative grouping strategies for the organization and recall of categorizable materials. Research Report #42. November 1972.

* ____ R. Riegel, F. Danner, & A. Taylor. Steps in sequence: Training educationally handicapped children to use strategies for learning. Development Report #2. November 1972.

____ A. Taylor, M. Thurlow & J. Turnure. The teacher's introduction to: The Math Vocabulary Program. Development Report #1. March 1973.

____ J. Turnure & M. Thurlow. The effects of structural variations in elaboration on learning by normal and EMR children. Research Report #41. September 1972. (American Journal of Mental Deficiency, 1975, 79, in press.)

____ A. Taylor & N. Bender. Variations of strategy training and the recognition memory of EMR children. Research Report #40. September 1972. (Bender, N. & Taylor, A. Instructional Treatments Based on Learning Strategies and the Recognition Memory of Retarded Children. American Educational Research Journal, 1973, 10(4), 337-343).

* D. Moores, C. McIntyre, & K. Weiss. Evaluation of programs for hearing impaired children: Report of 1971-72. Research Report #39. September 1972.

____ R. Rubin. Follow-up of applicants for admission to graduate programs in special education. Occasional Paper #11. July 1972.

____ D. Moores. Communication -- Some unanswered questions and some unquestioned answers. Occasional Paper #10. July 1972.

____ A. Taylor & S. Whitely. Overt verbalization and the continued production of effective elaborations by EMR children. Research Report #38. June 1972. (Whitely, S. & Taylor, A. American Journal of Mental Deficiency, 1973, 78(2), 193-198).

____ R. Riegel. Measuring educationally handicapped children's organizational strategies by sampling overt groupings. Research Report #37. May 1972.

____ E. Gallistel, M. Boyle, L. Curran, & M. Hawthorne. The relation of visual and auditory aptitudes to first grade low readers' achievement under sight-word and systematic phonic instruction. Research Report #36. May 1972.

____ E. Gallistel & P. Fischer. Decoding skills acquired by low readers taught in regular classrooms using clinical techniques. Research Report #35. May 1972.

____ J. Turnure & M. Thurlow. Verbal elaboration in children: Variations in procedures and design. Research Report #34. March 1972. (Study I: Journal of Genetic Psychology, in press).

____ D. Krus & W. Bart. An ordering-theoretic method of multidimensional scaling of items. Research Report #33. March 1972.

____ J. Turnure & S. Larsen. Effects of various instruction and reinforcement conditions on the learning of a three-position oddity problem by nursery school children. Research Report #32. March 1972.

____ J. Turnure & S. Larsen. Outerdirectedness in mentally retarded children as a function of sex of experimenter and sex of subject. Research Report #31. March 1972.

____ J. Rynders & M. Horrobin. A mobile unit for delivering educational services to Down's Syndrome (Mongoloid) infants. Research Report #30. January 1972. (Presented at Council for Exceptional Children, Special National Conference, Memphis, December, 1971.)

* F. Danner & A. Taylor. Pictures and relational imagery training in children's learning. Research Report #29. December 1971.

____ J. Turnure & M. Thurlow. Verbal elaboration phenomena in nursery school children. Research Report #28. December 1971. (Study II: Proceedings of 81st Annual Convention of the American Psychological Association, 1973, 83-84.)

____ D. Moores & C. McIntyre. Evaluation of programs for hearing impaired children: Progress report 1970-71. Research Report #27. December 1971.

____ S. Samuels. Success and failure in learning to read: A critique of the research. Occasional Paper #9. November 1971. (In M. Kling, The Literature of Research in Reading with Emphasis on Modes, Rutgers University, 1971.) (in Reading Research Quarterly, 1973, 8(2), 200-239.)

* S. Samuels. Attention and visual memory in reading acquisitions. Research Report #26. November 1971.

* J. Turnure & M. Thurlow. Verbal elaboration and the promotion of transfer of training in educable mentally retarded children. Research Report #25. November 1971. (Journal of Experimental Child Psychology, 1973, 15, 137-148.)

* A. Taylor, M. Josberger & S. Whitely. Elaboration training and verbalization as factors facilitating retarded children's recall. Research Report #24. October 1971. (Journal of Educational Psychology, 1973, 64, 341-346.)

____ W. Bart & D. Krus. An ordering-theoretic method to determine hierarchies among items. Research Report #23. September 1971.

____ A. Taylor, M. Josberger & J. Knowlton. Mental elaboration and learning in retarded children. Research Report #22. September 1971. (Mental Elaboration and Learning in EMR children. American Journal of Mental Deficiency, 1972, 77, 69-76.)

____ J. Turnure & S. Larsen. Outerdirectedness in educable mentally retarded boys and girls. Research Report #21. September 1971. (American Journal of Mental Deficiency, 1973, 78, 163-170.)

____ R. Bruininks, T. Glaman & C. Clark. Prevalency of learning disabilities: Findings, issues, and recommendations. Research Report #20. June 1971. (Presented at Council for Exceptional Children Convention, Miami Beach, April 1971.)

____ M. Thurlow & J. Turnure. Mental elaboration and the extension of mediational research: List length of verbal phenomena in the mentally retarded. Research Report #19. June 1971. (Journal of Experimental Child Psychology, 1972, 14, 184-195.)

____ G. Siegel. Three approaches to speech retardation. Occasional Paper #8. May 1971.

* ____ D. Moores. An investigation of the psycholinguistic functioning of deaf adolescents. Research Report #18. May 1971. (Exceptional Children, 1970, 36, 645-652.)

* ____ D. Moores. Recent research on manual communication. Occasional Paper #7. April 1971. (Keynote Address, Division of Communication Disorders, Council for Exceptional Children Annual Convention, Miami Beach, April 1971.)

____ J. Turnure, S. Larsen & M. Thurlow. Two studies on verbal elaboration in special populations. I. The effects of brain injury; II. Evidence of transfer of training. Research Report #17. April 1971. (Study I: American Journal of Mental Deficiency, 1973, 78, 70-76.)

____ R. Bruininks & J. Rynders. Alternatives to special class placement for educable mentally retarded children. Occasional Paper #6. March 1971. (Focus on Exceptional Children, 1971, 3, 1-12.)

____ D. Moores. Neo-oralism and the education of the deaf in the Soviet Union. Occasional Paper #5. February 1971. (Exceptional Children, 1972, 39, 377-384.)

____ D. Feldman, B. Marrinan & S. Hartfeldt. Unusualness, appropriateness, transformation and condensation as criteria for creativity. Research Report #16. February 1971. (American Educational Research Association Annual Conference, New York, February 1971.)

____ P. Broen & G. Siegel. Variations in normal speech disfluencies. Research Report #15. January 1971. (Language & Speech, 1972, 15, 219-231.)

* ____ D. Feldman. Map understanding as a possible crystallizer of cognitive structures. Occasional Paper #4. January 1971. (American Educational Research Journal, 1971, 3, 484-502.)

* ____ J. Rynders. Industrial arts for elementary mentally retarded children: An attempt to redefine and clarify goals. Occasional Paper #3. January 1971.

____ D. Moores. Education of the deaf in the United States. Occasional Paper #2. November 1970. (Moscow Institute of Defectology, 1971, published in Russian.)

____ R. Bruininks & C. Clark. Auditory and learning in first-, third-, and fifth-grade children. Research Report November 1970.

____ R. Bruininks & C. Clark. Auditory and visual learning in first grade educable mentally retarded normal children. Research Report #13. November 1970. (American Journal of Mental Deficiency, 1972, 76(5), 561-567.)

____ R. Bruininks. Teaching word recognition to disadvantaged boys with variations in auditory and visual perceptual abilities. Research Report #12. November 1970. (Journal of Learning Disabilities, 1970, 3, 30-39).

____ R. Bruininks & W. Lucker. Change and stability in correlations between intelligence and reading test scores among disadvantaged children. Research Report #11. October 1970. (Journal of Reading Behavior, 1970, 2, 295-305.)

____ R. Rubin. Sex differences in effects of kindergarten attendance on development of school readiness and language skills. Research Report #10. October 1970. (Elementary School Journal, 72(5), February 1972.)

____ R. Rubin & B. Balow. Prevalence of school learning and behavior disorders in a longitudinal study population. Research Report #9. October 1970. (Exceptional Children, 1971, 38, 293-299.)

____ D. Feldman & J. Bratton. On the relativity of giftedness: An empirical study. Research Report #8. August 1970. (American Educational Research Annual Conference, New York, February 1971.)

____ J. Turnure, M. Thurlow & S. Larsen. Syntactic elaboration in the learning and reversal of paired-associates by young children. Research Report #7. January 1971. (Study II: Journal of Genetic Psychology, in press.)

____ R. Martin & L. Berndt. The effects of time-out on stuttering in a 12-year-old boy. Research Report #6. July 1970. (Exceptional Children, 1970, 37, 303-304.)

____ J. Turnure & M. Walsh. The effects of varied levels of verbal mediation on the learning and reversal of paired associates by educable mentally retarded children. Research Report #5. June 1970. (Study I: American Journal of Mental Deficiency, 1971, 76, 60-67. Study II: American Journal of Mental Deficiency, 1971, 76, 306-312.)

____ J. Turnure, J. Rynders, & N. Jones. Effectiveness of manual guidance, modeling and trial and error learning for inducing instrumental behavior in institutionalized retardates. Research Report #4. June 1970. (Merrill-Palmer Quarterly, 1973, 19, 49-65.)

____ J. Turnure. Reactions to physical and social distractors by moderately retarded institutionalized children. Research Report #3. June 1970. (Journal of Special Education, 1970, 4, 283-294.)

* D. Moores. Evaluation of preschool programs: An interaction analysis model. Occasional Paper #1. April 1970. (Keynote Address, Diagnostic Pedagogy, International Congress on Deafness. Stockholm, August 1970; also presented at American Instructors of the Deaf Annual Convention, St. Augustine, Florida, April 1970.)

____ D. Feldman & W. Markwalder. Systematic scoring of ranked distractors for the assessment of Piagetian reasoning levels. Research Report #2. March 1970. (Educational and Psychological Measurement, 1971, 31, 347-362.)

____ D. Feldman. The fixed-sequence hypothesis: Individual differences in the development of school related spatial reasoning. Research Report #1. March 1970.

* Out of print